



ORIGINAL



MISSOURI DEPARTMENT OF ELEMENTARY AND SECONDARY EDUCATION
SCHOOL IMPROVEMENT - FEDERAL DISCRETIONARY GRANTS SECTION
MATHEMATICS AND SCIENCE PARTNERSHIP PROGRAM
REQUEST FOR PROPOSAL - HIGH SCHOOL SCIENCE REFORM
PROJECT DATES: October 21, 2005 TO Sep 30, 2006

FOR DESE USE ONLY

SIGNATURE OF AUTHORIZED DESE OFFICIAL

Craig Rabe

DATE

10-21-05

DIRECTIONS

Mail the completed postmarked by Friday, Oct 7, 2005 to: Federal Discretionary Grants, Missouri Department of Elementary and Secondary Education, 205 Jefferson Street, PO Box 480, Jefferson City, MO 65102-0480
Questions, contact Federal Discretionary Grants: Ph: (573) 526-3232; Fax: (573) 526-6698; or e-mail to: webreplyimprfdg@desemo.gov; Visit DESE's website at: desemo.gov

Sec. I. TOTAL BUDGET BY FUNDING CATEGORY

6100: Salaries	6200: Employee Benefits	6300: Purchased Services	6400: Materials/ Supplies	SUBTOTAL	6500: Capital Outlay	TOTAL
174,396	32,627	431,232	325,843	967,098	0	967,098
\$ 138,893	\$ 20,000	\$ 354,946	\$ 279,655	\$ 799,579	0	\$ 799,579

NUMBER OF TEACHERS TO BE SERVED DIRECTLY

84 99

☒ FIRST YEAR ☐ SECOND YEAR ☐ THIRD YEAR

Sec. II. APPLYING INSTITUTION

APPLYING INSTITUTION / FISCAL AGENT

Columbia Public Schools (Columbia 93)

CONTACT ADDRESS (STREET ADDRESS, CITY, STATE & ZIP-CODE)

Science Department, 555 Vandiver Drive, Columbia, MO 65202

NAME OF CONTACT

Sara Torres, K-12 Science Coordinator

NONPROFIT STATUS NUMBER

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LEAD SCHOOL DISTRICT

Columbia 93

COUNTY DISTRICT CODE

010-093

ADDRESS (STREET ADDRESS, CITY, STATE & ZIP-CODE)

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NAME AND TITLE OF CONTACT

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LEAD INSTITUTION OF HIGHER EDUCATION

University of Missouri-Columbia

ADDRESS (STREET ADDRESS, CITY, STATE & ZIP-CODE)

Department of Physics and Astronomy, University of Missouri, Columbia MO 65211

NAME AND TITLE OF CONTACT

Meera Chandrasekhar, Professor of Physics

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Total Budget reflects a combination of Total Budget Forms found on page 29 of original grant & page 4 of the Additional Participants Attachment.
CR
12-19-05

Sec. III. ASSURANCES AND CERTIFICATION

Should an award of funds from the Mathematics and Science Partnership Program be made to the applicant in support of the activities proposed in this application, the authorized signature on the cover page of this application certifies to the (State Department of Education) that the authorized official will:

1. Upon request, provide the Missouri Department of Education with access to records and other sources of information that may be necessary to determine compliance with appropriate federal and state laws and regulations;
2. Conduct educational activities funded by this project in compliance with the following federal laws: Title VI of the Civil Rights Act of 1964; Title IX of the Education Amendments of 1972; Section 504 of the Rehabilitation Act of 1973; Age Discrimination Act of 1975; Americans with Disabilities Act of 1990; and Improving America's Schools Act of 1994;
3. Use grant funds to supplement and not supplant funds from nonfederal sources;
4. Take into account during the development of programming the need for greater access to and participation in the targeted disciplines by students from historically under represented and under served groups;
5. Submit, in accordance with stated guidelines and deadlines, all program and evaluation reports required by the U.S. Department of Education and the Missouri Department of Education.
6. Ensure that private schools in the attendance area of the public school participating in the Mathematics and Science Partnership Program will be consulted in a timely and meaningful way. The Applicant will arrange for and facilitate the equitable participation of non-public staff in the planning of this project and the participation of non-public educational personnel in professional development activities developed by this proposal as required by Section 9501 of NCLB. See page 3 of RFP for specific details.

The applicant certifies that to the best of his/her knowledge the information in this application is correct, that the filing of this application is duly authorized by the governing body of this organization, or institution, and that the applicant will comply with the attached statement of assurances.

SIGNATURE OF AUTHORIZED REPRESENTATIVE



DATE

10/5/05

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ACADEMY FOR TEACHERS - INQUIRY AND MODELING EXPERIENCES FOR PHYSICS FIRST (A TIME FOR PHYSICS FIRST)

Sec. IV. ABSTRACT

A-TIME for Physics First is formulated on the needs and ideas expressed by our partnership: 11 partner districts, 2 universities, 3 state educational centers, a business, and a non-profit organization. The immediate (3-year) goal is to design and implement a professional development (PD) curriculum for teachers, and to teach Physics First (PF) in 9th grade classrooms, thus increasing the number of highly qualified physics/physical science teachers. The project's long-term goal is to increase the proficiency of students in science as evidenced by MAP scores, and to increase students' interest and success in science / engineering degrees. (Data outside timeline of project).

The academy will target 60 9th grade teachers from partner districts. Secondary targets will be 12 math teachers and 12 administrators from the same districts, who will personally experience PF and help support PF during the school year. Topical foci for PD will be: Force, Motion and Matter (year 1); Electricity and Magnetism (year 2); Heat, Light, Waves and Sound (year 3).

The academy will be organized in 3 phases: a curriculum committee composed of partner representatives will meet monthly in phase 1 (AY 2005-06) to design a research-based PF PD curriculum that draws upon available resources; in phase 2 (summer 06) the summer content academy will be conducted; in phase 3 (AY 2006-07), teachers will implement PF, receive in-class coaching/mentoring, conduct lesson-study in professional learning teams (PLT), mentor protégés, attend follow-up sessions and conferences. This cycle will be repeated for 3 summers. Lessons and assessments constructed in phases 1 and 2 will be tested in classrooms and collaboratively revised to produce the PF-PD packet for DESE.

Sec. V. COMMITMENT AND CAPACITY OF PARTNERSHIP

The partners composing this project -- higher education, school districts, business, and education support groups -- have a shared vision of a 9th grade Physics First philosophy. They recognize the need to transform physics instruction to appropriate content and pedagogy and the need to provide long-term support through summer and follow-up PD activities. Described below are participating personnel and their expertise.

Sec. V.1. PARTNERSHIP AND PERSONNEL

Partner Districts and Their Profiles Relative to the High Need Criteria:

The project includes 10 partner districts with 52-60 potential science-teacher participants. This count includes 5 teachers from 3 private schools in the LEA's. These teachers and administrators from partner districts will participate on the Advisory Board and Curriculum committee.

The profile of each partner district is tabulated in Appendix A. Of the 10 partner districts, 9 satisfy the criterion for high need in the free and reduced lunch category (range: 21 % to 54 %). One has a large percentage of teachers teaching outside the field. The percentage of students scoring below proficient levels in the 10th grade science MAP scores range from 79.3% to 97 %. We can safely assume that all districts are high need in this category.

Partner Districts: Columbia 93 (lead) Carthage R-9 Hazelwood Ferguson Florissant Frances Howell Mehlville Morgan R-II Perry County Seneca Webb City
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Leadership:

Sara Torres, K-12 Science Coordinator, Columbia Public Schools (CPS) will be the project director. She will coordinate recruitment of partner districts, and function as the chair of the Advisory Board and Curriculum Committee. She will guide the construction of PF curriculum, for which her experience as a science teacher and science coordinator will be invaluable. She will

communicate with district liaisons, gather and organize information on the needs of the districts in the areas of content, curriculum, pedagogy, materials, mentoring and assessment. She will oversee grant accounts at CPS, and accounts submitted by other partners. She will be responsible for completing all forms and assuring that requirements and guidelines are followed. She will be assisted by a part-time **fiscal administrative assistant**. Ms Torres taught for 12 years in the New Mexico and Columbia public school systems and has been science coordinator since 2004. She earned her Educational Specialist Degree in Educational Management and Development from New Mexico State University. She was awarded the New Mexico Elementary Science Teacher of the Year. Ms. Torres has presented workshops at the national, state, and local levels and has been involved in action research with Systemic Initiative for Math and Science Education through the Southwest Educational Development Labs. She has also received numerous grants, including The US West Technology Grant and the GTE Growth Initiative for Teachers Grant.

Meera Chandrasekhar, Professor of Physics, University of Missouri-Columbia (MU), will be one of two content experts. She will be the lead higher education liaison. She will be primarily responsible for teaching one section of the physics content in the summer academy, with a **peer teacher** and a **teaching assistant**, using the curriculum developed by the curriculum committee. She will make the day-to-day decisions of the university partners, and be responsible for pricing and ordering equipment and materials for the academy. She will be the contact person for the coach-mentor group. She will be responsible for overseeing MU's part of the grant accounts, which includes equipment, onsite expenses and coach-mentors. She will be assisted by a half-time **project coordinator**, Ms. Sarah Hill. Dr. Chandrasekhar has conducted professional development (PD) in physics for 5-9 grade teachers since 1993, funded by the National Science Foundation and the CBHE/DHE Eisenhower and Teacher Quality grants. She has received several honors for her teaching, including the Presidential Award for Excellence in Science, Engineering and Mathematics mentoring (NSF, 1999), the Kemper Award (MU, 1997), the Distinguished Service Award (STOM, 2004), and the Curators' Distinguished Teaching Professorship (MU, 2004-present).

Mark Volkmann, Associate Professor of Science Education, MU, will provide expertise in the areas of instructional strategies, formative assessment, and inquiry. He will consult with the curriculum committee as they design instruction for the summer academies. In addition, he will help participants make explicit connections between assessments, decision-making, and instructional strategies. He was previously a high school teacher, and has published extensively on inquiry, the learning cycle, and assessment.

Kandiah Manivannan, Associate Professor of Physics and Physics Education, Missouri State University, (MSU) Springfield, will be the second physics content expert and the modeling expert. He will train and advise the team on adapting modeling to the Physics First (PF) curriculum. He will be lead instructor of the second section of the summer academy. He will direct follow-up sessions at Springfield for those participants who find that location more geographically accessible. He has received training on modeling physics techniques at the Arizona State University, which he has used to conduct PD for high-school teachers in physics and chemistry. He has been awarded several CBHE/DHE Eisenhower and Teacher Quality grants.

All members of the Leadership team have considerable experience with grants, sustained programs following grants, and networking.

Several of Dr. Chandrasekhar's programs have been sustained beyond the granting period: Exploring Physics extracurricular program for 5-8 grade (funded 1992-97); Families Exploring Science and Technology (grade 6-7) and Saturday Scientist (grade 8-9) (funded 1997-2002); Inservice institutes (funded 1993-2005) have led to curricula now used in Physics 2330, a physics course for Elementary Education majors at MU, serving 120 students/year.

Ms. Torres has networked with several of our partners in several capacities as Science Coordinator, and was a prime mover in bringing our partners together following CPS's Curriculum Review Cycle in March 2005, where she initiated discussion and collected data on districts

interested in Physics First. Dr. Volkmann has worked with teachers from districts in MPER (Missouri Partnership for Educational Renewal) for over five years. Drs Chandrasekhar and Manivannan have worked with teachers from several districts over a period of over ten years.

Leadership Associates:

Two master teachers will be hired as **peer-teachers** for the summer academy. They will play a crucial role in conducting the activities of the summer academy. They will be physics teachers who have taught at the high-school level, and will spend time to become intimately familiar with the curriculum and pedagogy designed for use at the academy.

Five Coach-Mentors who are retired master teachers will be hired. Each will work with 12 teachers through monthly classroom visits. They will provide feedback to teachers and to project staff, and assist teachers in preparing proposals and making presentations at conferences. They will assist with videoconferences during follow-ups, visit lesson-study groups, and attend summer academies with teachers. Two or three of them will also serve on the curriculum committee.

Consultants and Student Assistants:

Several faculty and consultants will have significant involvement in the project. **James Tarr** (MU), Assistant Professor of Math Education, will work with the curriculum committee and participants on appropriate math content and terminology; **James Puckett**, Director, E-High School (MSU) will assist distance-learning technology during follow-ups and professional learning team meetings. Consultants from school districts who have experience with the implementation of PF curriculum and modeling techniques (e.g., **Rex Rice** from Clayton) will provide advice to project staff and present at the summer academy. Other consultants will train coach-mentors on lesson analysis and coaching techniques. **Graduate assistants** will assist with academy teaching. **Undergraduate assistants** will help with web site design and maintenance, set-up and testing of experiments, kit preparation and kit processing for the lending library.

State and Regional Educational Centers and Associations:

The Heart of Missouri Regional Professional Development Center (RPDC) and the St. Louis RPDC have excellent contacts and will serve as a conduit for utilizing exceptional participants as future PD consultants for Missouri districts interested in PF. This partnership will help the sustainability of this project. In addition, the RPDC will serve as a consultant as the project creates the PF-PD package for DESE.

Non-profit and Business Partners:

Ralph Dumas and members of the **Central Missouri Astronomical Association** (CMAA) will present sessions on telescopes, data collection from NASA sites, and set up viewing on selected evenings. CMAA regularly runs telescope viewings on the roof of the Physics Building at MU and other locations, and conducts astronomy outreach throughout Central Missouri. They are allied with astronomical associations statewide. Jay Hashieder, Energy Management Specialist and colleagues from **Columbia Water and Light** will present Energy modules that they have utilized extensively for 9th grade at CPS. Other business / nonprofit partners may be added in the second and third years.

The academy will invite several dynamic speakers on a variety of topics – scientists and engineers who can provide connections between academy content and real-world applications, and speak about possible careers for students who are trained in science. Speakers from the Missouri-NASA Education Program and the CPS planetarium will present on astronomy topics.

Evaluation:

M.A. Henry Consulting, LLC will conduct the evaluation (see Sec VIII). Dr. Henry brings experience in K-20 teaching, PD, program development and evaluation. Mr. Murray has national research experience through Washington University in St. Louis and has worked in informal science

education. Both are lead evaluators for the Robert Noyce Scholarship project at MU and for NSF's Math-Science Partnership at Washington University in St. Louis. They were evaluators for the MO-DHE funded Teacher Quality Improvement (Cycle 1) project led by Dr. Chandrasekhar.

Staff:

A part-time **fiscal administrative assistant** at CPS will assist with correspondence, financial management (stipend and travel payments to participants, accounting to report to DESE), and other paperwork. S/he will report to Ms. Torres.

Sarah Hill, project coordinator at MU, will coordinate the academy-related administrative work. She will report to Dr. Chandrasekhar. She will keep track of Institutional Review Board permissions for human subjects' research, communication with partners and participants, applications and admissions details; she will also arrange the day-to-day needs of the summer academy such as dormitory reservations, meals and meal plan paperwork, and attendance. She will supervise two undergraduate students as they assemble equipment kits and print materials, and coordinate the kit lending library. She will organize coach-mentor visit schedules and associated paperwork. Ms. Hill worked for 6 years in a similar capacity with the ShowMe Science Center.

Sec. V.2. GOVERNANCE STRUCTURE

The **Leadership Team** will be composed of the Principal Investigator (PI), Ms. Sara Torres (CPS), Co-Principal Investigators Drs. Meera Chandrasekhar and Mark Volkmann, (MU); and Dr. Kandiah Manivannan, (MSU). The leadership team will meet regularly in order to direct the work of the other groups. The Advisory Board will provide guidance to the Leadership Team; the Leadership Team will establish the agenda for the work of the Curriculum Committee. Between the Advisory Board and the Curriculum Committee, all districts will have at least one representative, including a representative from a non-public school. Figure 1 illustrates the relationship between the various groups.

The **Advisory Board** (Ms. Torres, Chair) will consist of district administrators (2), participant teachers (2), DESE personnel, MU administrator (1), academy faculty (2), coach-mentor (1), an external evaluator and at least 3 external education experts, including Profs. Sandra Abell (MU) and Patricia Lucido (Northwest Missouri State). They will review progress and evaluations and provide oversight and advice. Board members will visit the summer academy and interact with the participants to assess the impact of project activities. The board will meet two times a year.

The **Curriculum Committee** (CC), Ms. Torres, Chair, will consist of partner district science administrators (Ms. Torres and two others), partner district 9th grade science teachers (2 or 3), higher education faculty (Drs Manivannan, Volkmann and Chandrasekhar), coach-mentors (2 or 3), and a DESE staff person. Other project staff – faculty, consultants, and evaluators – will meet with the CC as needed (at least 2 times every year). The CC has a dual role – (1) designing academy activities and curriculum and (2) writing curriculum. This committee will meet monthly prior to the 2006 summer academy and make the bulk of the academy's decisions. The CC will design the academy curriculum and activities. This design will determine (a) depth of content and appropriate methodology (b) alignment with Missouri Grade Level Expectations (GLEs) (c) equipment, materials and technology suitable for activities (d) equipment needed in teacher kits and in classroom sets for the kit lending program (e) criteria for participant acceptance if the academy is oversubscribed (f) frequency of future meetings beyond summer 2006 (g) write curriculum for

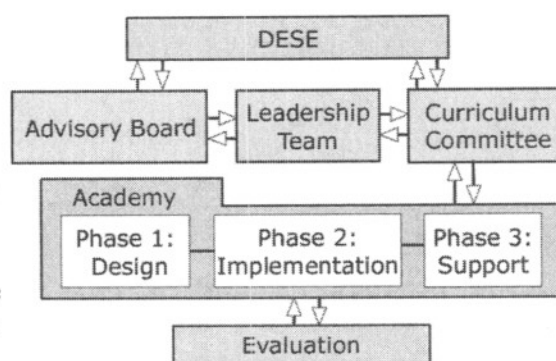


Figure 1. Governance Structure

academy. Additionally, 7 teacher participants and 2 consultant teachers from Clayton High School or another school that has successfully implemented PF will assist in writing curriculum. The CC will function for all three years of the grant.

Two panels within the CC will work on writing the curriculum – writing teams and an advisory team. Their detailed functions are described in Sec. VI.3.A. These panels will produce the PD packet to be delivered to DESE.

The **Evaluation Team** (see Section V for personnel) will have the responsibility for evaluating the design of the summer academies, the implementation of academy instruction, and the support provided for the academic year activities.

Each **school district** will designate one administrator as the district liaison. Liaisons will be responsible for their internal paperwork and communication with the partnership, such as sending their district's needs when requested, providing the evaluator with required information (permissions, test scores) etc. One **coach-mentor** will be designated as the lead, and s/he will be a member of the curriculum committee. All coach-mentors will meet to debrief in conjunction with the follow-up meetings with the leadership team and evaluator. Groups will **communicate** via e-mail, a list-serv, and postings on the project website, conference calls or video conference.

CPS will function as the **fiscal agent**. Ms. Torres (CPS) will oversee grant accounts submitted by partners. CPS will process stipends and travel expenses for all district personnel and consultants. MU (Dr. Chandrasekhar) will be responsible for expenses related to coach-mentors, purchasing material and equipment for academy, room and board, and non-district personnel travel. Dr. Manivannan will oversee MSU salaries and travel. Dr. Henry will coordinate the evaluation budget.

Sec. VI. PROJECT NARRATIVE AND TIMELINE

Sec. VI.1. PROGRAM GOALS AND OBJECTIVES

The overall goal is to improve science achievement of secondary students in Missouri through creation of a partnership to design and implement exemplary PD for Physics First (PF), a 9th grade conceptual physics course. Five objectives and associated activities will help work toward this goal.

- **Objective 1.** Partners will design and implement PD curriculum for a PF course that is responsive to districts' needs, aligned with MO-GLEs in content, research-based in methodology, and connected to real-world applications. This curriculum will be delivered to DESE at the end Year 3.
- **Objective 2.** Partner teachers will increase physics content knowledge in MO-GLE areas, obtain graduate credits and achieve physics certification. (Measured by validated pre/post tests, transcripts)
- **Objective 3.** Partner teachers will improve skills in the areas of modeling- and inquiry-based instruction, student assessment, and effective use of technology. (Measured by lesson video analysis)
- **Objective 4.** Partner teachers will employ their content knowledge and teaching skills in their classrooms, and monitor and improve them with the effective use of Professional Learning Team (PLT) lesson-studies, coaching and mentoring. (Measured by video analysis and pre/post tests)
- **Objective 5.** Students in partner schools will increase overall physics achievement in grade 9, and take more science courses in higher grades. (Measured by validated pre/post student tests)

The evaluation plan for these objectives is detailed in Sec. VIII.

Sec. VI.2. PARTNER SCHOOL DISTRICT NEEDS

Potential partner schools, who had expressed interest in PF to CPS and DESE, were invited to a September 8, 2005 meeting by Ms. Torres. Representatives from 9 partner districts and 4 university departments met at the CPS Science Office. Districts expressed their needs in the areas of content, pedagogy, materials /equipment, coaching, and assessment, summarized in Table I below.

Table I. Summary of needs expressed by partners.	
<i>Teacher participants should:</i> <ul style="list-style-type: none"> • participate in sustained PD on PF content over 3 years • participate in sustained mentoring • examine PF software, texts and technology • craft assessments for use by partner districts • conduct lesson-study in groups to support teaching physics content in their classes 	<i>The curriculum should:</i> <ul style="list-style-type: none"> • integrate physics content and pedagogical methods (inquiry, modeling, 5E cycle) • align content with GLEs consistent with 9th grade • recognize differing local district needs • incorporate real-world contexts use energy as a unifying theme • be culturally and gender inclusive
<i>The Summer Academy should:</i> <ul style="list-style-type: none"> • include sessions with master teachers trained in and utilizing modeling for 9th grade • differentiate instruction to accommodate the variety of participant needs 	<i>The organizers should:</i> <ul style="list-style-type: none"> • invite key personnel from districts that have implemented PF to provide advice • provide distance learning for follow-up sessions and mentoring

<ul style="list-style-type: none"> • incorporate math content and terminology • include math teachers for parts of academy • include following content sequence: Force, Motion and Matter (2006) Electricity and Magnetism (2007) Light, Heat, Waves and Sound (2008) 	<ul style="list-style-type: none"> • provide equipment / materials for classroom use on a lending-library basis • choose equipment durable for 9th graders • provide master-teacher coach-mentors who visit classes and lesson-study groups regularly, and help analyze lesson videos
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Sec. VI.3. PROJECT ACTIVITIES

Partners discussed the activities necessary for intensive PD in the light of their needs and project objectives, and decided that the academy should be planned by a collaborative group called the Curriculum Committee (CC), and should be based on a 3-phase process:

Phase 1, Preceding Year: Plan Curriculum and Summer Academies (Objective 1)

Phase 2, Summer: Implement Summer Academies (Objectives 2 and 3)

Phase 3, Academic Year: Follow-up, Support (Objective 4) and Student Assessment (Objective 5).

Sec. VI.3.A. Phase 1, Preceding Year: Plan Curriculum and Summer Academy (Objective 1)

All facets of the PF-PD curriculum – content, expectations, assessment, activities, strategies, resources and metacognitive aspects – will be designed collaboratively by the CC, which represents districts, higher education, coach-mentors, and DESE (Sec. V.2). Four curricula were discussed by the partners – Arizona State University’s *Modeling Physics*¹, CPO Science’s *Physics A First Course*², It’s About Time’s *Active Physics*³ and Hewitt’s *Conceptual Physics*⁴. All integrate hands-on lessons with specific equipment to different degrees. Partners discussed their benefits and drawbacks. They agreed that the PF-PD curriculum design should begin with a close examination of these curricula, along with materials used by the leadership team for previous physics academies.

The backward design-model⁵ will be utilized to design the curriculum. It consists of first examining GLE content objectives, then creating aligned assessments that reflect what teachers must know, and finally creating lessons to learn the essential curriculum. The lessons will integrate: alignment to MO-GLEs; content depth, mathematical analysis and suitable assessments⁶; equipment /materials /examples that are friendly for diverse students; a mix of equipment made of familiar materials, probe-ware, and technology; reading materials to buttress activities and concepts; experiences that relate directly to real-world applications; modeling and inquiry interwoven with content and modeled in the teaching; and relating specific phenomena to broad ideas in science.

The structure of the curriculum will integrate sequenced activities, some hands-on, with print and electronic resources, designed for easy export to classrooms. Content will be organized into modules (e.g., 1D motion), with lessons following the 5E learning or modeling cycles⁷.

Partners discussed matching the PD to participants' content needs by assessing participants' experience in teaching physics content early. Teachers will self-report and take a diagnostic test in Jan 2006 to ascertain the range of their strengths. This diagnostic will be based on standardized tests.

Curriculum construction will begin with monthly CC meetings in Jan 2006. At the first meeting members will examine existing resources, decide on a suitable lesson format, and divide the summer 2006 content into 6-8 modules. A CC subgroup responsible for writing the curriculum will consist of 2 panels: 2-3 writing teams and an advising team. They will begin with the first 2 steps of the backward-design model for 2 modules. The writing teams, which will consist of science teachers and faculty who have strong content and pedagogical knowledge, will spend the first month writing lessons for one module each. Teams will place materials on a secure web site for easy access by the CC. The advising team will review the lessons prior to the February meeting, and revisions will be discussed. The writing team will make revisions before the March meeting. In parallel, they will work on the next modules. A total of 10 teachers, 3 from the CC and 7 others assisting, will work on the writing teams, as well as two writing teacher-consultants from a school (such as Clayton High School) that has successfully implemented PF.

In addition to the GLE content topics, there will be two themes that will permeate through the entire curriculum. The first and central theme will be Energy, manifest in various forms, which our Columbia Water and Light partners will reinforce via realistic applications. The second theme will address Quantitative Science. Dr. Tarr will help suitably integrate math techniques, content and terminology with physics. The CC will assess the extent to which other threads are included, such as literacy-linked notebooking, and field trips such as Amusement Park Physics.

The curriculum designed by the 2005-06 CC will be used in the 2006 summer academy. Participating teachers may adapt this curriculum for their 2006-07 classrooms. Teacher and student assessments (pre-post) will be used to gauge the effectiveness of the modules and iteratively revise them through lesson-study (described in Sec. VI.3.C). In 2006-07, the CC will design the Electricity and Magnetism curriculum for summer 2007 and also revise the Force, Motion and Matter curriculum for the DESE PD packet. Similar cycles will be used to complete the 3-year curriculum.

Sec. VI.3.B. Phase 2, Summer: Implementing the Summer Academy: (Objectives 2 and 3)

The primary audience will be 60 9th grade science teachers who will teach PF. They will

participate in a 3-week summer academy every year for 3 years, learning different content each summer, and be engaged in follow-up activities (Sec. VI.3.C). Two secondary audiences will be included: math teachers from partner districts will attend a week of the academy, participating in both science and math activities; and administrators, who will attend 2 days of the academy.

All participants (science and math teachers and administrators) will receive a stipend of \$100 /day (\$110 in year 3). They will commute or be housed in MU dormitories. Mileage, room and board are included. Science teachers will also receive 3 units of physics graduate credit toward physics certification. Math teachers will receive daily stipends and district inservice credit. MU has waived tuition costs for this project. Science teachers will receive kits and technology containing one set of equipment needed to perform all the activities.

The summer academy, which will meet for 6 hours/day on the MU campus, will be taught in 2 parallel sections. Each section will be led by a physics faculty member (Drs. Chandrasekhar or Manivannan), a peer teacher and a graduate teaching assistant (GTA). This six-person team will work through the curriculum in detail before the academy, to become thoroughly familiar with the equipment, techniques, and activities. Drs. Volkmann and Tarr, and Ms. Torres will also be present.

The academy will utilize equipment that is chosen by the CC for the institute, and is the same equipment that teachers receive in their kits. For 60 teachers, 20 sets of equipment will be purchased for the academy. A small amount of key demonstration equipment will also be purchased. During the school year, the academy equipment will serve dual purpose as a lending library for the school districts, allowing teachers to borrow the equipment for periods of three to five weeks as they teach specific units. This lending library will ensure that students of all teachers have the same high quality classroom learning experiences. This will also ensure that evaluation data is obtained from similar treatment groups.

Content-related activities (Objective 2) of each summer academy are summarized in Table II.

Table II. Summer Academy Physics Topics (referenced by GLEs)		All summers:
Year 1	Force and Motion, Matter; GLEs: 1:1:D; 1:2:A, B, C, E, F; 2:1:A, B, C; 2:2:A, B, D, E, F; 6:1:A, B, C; 6:2:C, D; 7:1:A, B, C, D, E; 8:1:B, C; 8:2:A, B; 8:3:B, D	<ul style="list-style-type: none"> • Pedagogy • Science Symposium • Assessment design • Mathematics • Technology • Problem-solving • Real-world Applications
Year 2	Electricity and Magnetism; GLEs: 1:2:B, C, E; 2:2:A, C, D, E; 5:2:D; 6:1:B, C; 7:1:A, B, C, D, E; 8:1:B, C; 8:2:A, B; 8:3:B, D	
Year 3	Heat, Light, Waves and Sound; GLEs: 1:1:D; 1:2:A, C, E, F; 5:1:C; 5:2:B, F, G; 6:1:B, C; 6:2:C; 7:1:A, B, C, D, E; 8:1:B, C; 8:2:A, B; 8:3:B, D (Note: Inquiry and Technology GLEs are included)	

The physics curriculum designed by the CC will be primarily taught by the 3-person team. Business and non-profit partners will present examples of real-world applications as they apply to specific physics content. The first example arises from CPS' ten-year partnership with Columbia Water and Light (CWL). CWL has developed modules used in 8-9 grade classrooms on energy use and conservation⁸. Their personnel will work with the CC to integrate these modules into PF and ensure alignment with GLEs, make presentations, and help make the modules transferable to other Missouri communities. We will investigate the possibility of engaging teachers in short internships with businesses.

Science symposia provide a second real-world link. Eight scientists and engineers from MU and industry will bring their research teams and present interactive seminars that connect research and applications to academy content. Visitors will speak about spacesuit design; fuel cells and alternative energy sources; superconductors; and flexible electronic chips. The symposia will be professionally recorded onto DVDs for use by teachers in their classes.

A third alliance will be with the Central Missouri Astronomical Association (CMAA), a group of dedicated volunteers known for astronomy outreach activities. They will discuss using NASA databases for lessons, and host telescope viewing for participants, complementing astronomy lessons presented by staff from the CPS planetarium and the Missouri NASA Education Center.

Methodology and Pedagogy Activities: (Objective 3) Pedagogy will be closely integrated into the content curriculum and modeled in the teaching. The primary strategies employed will be:

High-Yield Instructional Strategies: Modeling methodology and the 5E learning-cycle model⁹ that will provide a structure for PD lessons. Research-based strategies¹⁰ that support increased student achievement will be modeled (e.g., cooperative groups, graphic organizers, activating prior knowledge, conceptualization, model building, determining similarities and differences).

Science as Inquiry: The attributes of inquiry will be addressed throughout, e.g., teachers will analyze and modify traditional, "cookbook" labs to incorporate inquiry-based science teaching¹¹.

Formative and Summative Assessment: Formative assessment tasks such as notebook entries, exit slips or performance tasks will be designed to frequently monitor learning. Participants will develop MAP-like assessment items aligned with the GLEs for their grade level as summative assessments.

Analysis of Student Work: Participants will learn to examine student work^{12,13} for the quality of

student learning. They will share the results of their analysis, pinpoint learning problems and discuss strategies for improvement during their lesson-study group sessions.

Connections to Technology (Objective 3): Teachers will work with several technologies for data-gathering and analysis. They will evaluate software and hardware; use probe-ware, PDA-based data collection, digital voltmeters interfaced to computers, simulations, animations, applets, CDs and websites. The academy will include time to learn and appropriately utilize technology. Several vendors will be examined before choosing technology. The project web site will be an exchange portal during collaborative phases. It will also be used to collect student test data and PLT lesson-study journals. Evaluation surveys will be setup online with password protection.

Summer Academy Structure: Table III shows a sample schedule. Morning sessions will focus on physics content, modeling different pedagogies using hands-on activities, discussions for concept development, data gathering, and analysis – as designed by the CC.

Table III. Hours allocated – sample schedule	
Physics instruction	52
Pedagogy	6
Assessment Design	6
Math Connections	6
Problem-solving	5
Technology Practice	5
Symposium	8
Tests	2
Total	90

Afternoon sessions will include math, physics problem-solving with guided practice and homework, strategies, science symposia, and technology practice. Teachers will design assessments for students with appropriate depth based on the Force Concept Inventory¹⁴ (FCI) and released MAP items. Validated pre-/post-tests will evaluate participants' content knowledge growth (Sec VIII describes the validation process).

Drs. Chandrasekhar and Manivannan, peer teachers and GTAs will lead content, problem-solving, and technology activities; Dr. Volkmann and Ms. Torres will lead pedagogy and assessment; Dr. Tarr will lead math activities. While activity leaders are designated, others will be present as well. Experienced participants may also function as resource staff during afternoons.

Math Teachers at the Academy: Twelve math teachers from partner districts will attend the academy during week #1 when math activities (content, terminology, and techniques) will be discussed. By partaking in science activities, math teachers will understand the context in which math is used in PF, and learn how mathematics and science provide mutual support.

Administrators at the Academy: Administrative support is vital as schools change curriculum. Twelve administrators will attend the academy for 2 days with their science teachers. Before the academy they will be sent information on PF, which they must read and discuss at the academy.

During the academy they will experience activities with teachers for part of the day. Administrators will also be given time to discuss implementation, discuss what they should observe during evaluation walk-throughs, consult with PF experts, discuss future support of PF beyond the grant period, and network for future support. The administrators will return during one of the follow-up sessions in order to stay abreast with the academy.

Sec. VI.3.C. Phase 3, The Academic Year: Follow-up, Support (Objective 4) and Student Assessment (Objective 5)

Academic-year activities are designed to provide support as teachers implement new curricula.

Teaching: Each teacher will teach at least half the academy content modules, and evaluate student learning using pre/post-tests that will include validated items constructed at the academy.

Follow-up sessions will be held on three Saturdays during the year in at least 2 locations – at MU and at MSU in Springfield; the fourth will be held in conjunction with the STOM or Interface conferences, with attendance supported by this grant. Participants will attend two meetings in person and two more via distance learning sites to minimize travel.

Table IV. Follow-up Schedule	
Activity	Hrs
Four Follow-up days	24
Lesson-study meetings, incl. 2 coach visits	20
Coach-mentor visits (6)	18

Follow-up meetings will focus on content and classroom implementation. Teachers will discuss their classroom experiences in the form of lesson study analyses. Topics may include new activities, technology, GLE alignment, strategies, assessment results, etc. During years 2 and 3 the focus will shift from implementation of PF to becoming providers of high-quality PF PD¹⁵ within the state.

Five coach-mentors will be hired to provide teachers feedback and support. These individuals will be highly qualified master science teachers who are retired or willing to take a sabbatical, and are in geographic proximity with partner districts. They will receive training from RPDC personnel using the Cognitive Coaching¹⁶ or similar model during the academy and revisit their training during a follow-up day. A designated lead coach will manage the group and maintain communication among them. Coaches will meet monthly, and conduct a conference call every week. Each coach will mentor 12 participants, and visit each one 8 times during the school year. The coach will observe at least 2 class periods, and visit with the teacher afterwards. Coaches will videotape 2 classes and score the lessons with the teacher using an analysis instrument such as the Lesson study procedure¹⁷ or Science Classroom Observation Profile System¹⁸. As stated previously,

2-3 coaches will serve on the CC, and all 5 will attend the summer academy and follow-up sessions.

Professional Learning Teams: Teachers report that high-level, systematic peer collaboration after content academies is what makes PD effective¹⁹. The RPDC will provide the initial training for PLTs during the summer academy. Our PLTs fill this role through initial planning, frequent meetings, teaching, observation, videotaping and reflection. PLTs will be formed by 3-4 teachers within schools or districts, or by combining districts. They will meet regularly to develop expertise in physics content, instruction, and assessment. The PLT is structured by a 1 credit, 1 semester graduate course called *Lesson Study*. Teachers will focus on skills or dispositions that they want to promote in their students (e.g., fostering autonomous thinking when students examine physics phenomena). Teachers will generate research questions on developing these dispositions in learners. Specific content goals will be articulated for each study lesson.

Teachers will initially work together to develop a lesson²⁰ for a physics topic that students find difficult. One teacher will teach the lesson and be videotaped and/or observed by the others. The PLT will critique the lesson taught as a group, examine student work, and refine the lesson. A second PLT teacher will teach the revised lesson and videotape it. The PLT will meet again to critique the revised lesson. This process will be iterated at least 3 times or until the lesson has been deemed a powerful lesson and students have learned the difficult concept. PLTs will meet intensively for 2-4 weeks (10-12 hours) while they work on a lesson; later they will meet monthly to share lessons, student work, assessments and student data. Teachers will be paid a stipend for 20 hours a year at the academy rate of pay. In Year 1 a PLT will study their first lesson, advancing to a second lesson in years 2 and 3. Two PLT meetings will be attended by their coach-mentor. Communication with education faculty will be maintained through distance learning.

Protégés: To build capacity, teachers will be encouraged to nurture a non-participating 9th grade teacher in their building or district as a protégé. They will mentor the protégé with curricular resources as PF is implemented in their school. Protégés will be encouraged to take part in PLT meetings. School districts will provide inservice credit for this activity.

Equipment Support: A limited number of classroom sets of equipment will be available as a lending-library; kits will be shipped to teachers upon request as they teach specific modules. This

support is critical to having participants immediately implement the hands-on activities and technology they have learned during the summer academies. Additionally, this equipment will support the evaluative process. Teachers will be also supported by faculty through email and web-based video conferencing.

Assessment: Student assessment of each module will be conducted via pre-/post tests that are teacher-generated, but which include validated items developed at the academy. These assessments will evaluate the effectiveness of modules, and will provide feedback during teachers' lesson study.

Sec. VI.3.D. Timeline

Table V. Timeline of Activities (shaded areas indicate activity that semester)	Year 1			Year 2			Year 3		
	F*	W	S	F	W	S	F	W	S
Advisory Board meets									
Curriculum committee meets monthly to design curriculum, summer & follow-up activities									
Continue to recruit participants, if necessary									
Teach summer academies									
Participants teach content; assess students pre/post									
Disseminate classroom kits									
Follow-ups, coach-mentor visits, PLT, mentor protégés									
Formative evaluation									
Summative evaluation									

* F = Fall, W = Winter and S = Summer semesters

Sec. VI.3.E. Recruitment and Selection of Participants

Recruitment: 60 teachers will be recruited from the partner districts and statewide. Recruitment materials and the web site will describe the activities, expectations, and benefits of the project.

Teams: The project will recommend that districts send 2 or more teachers to the academy so that they have local support and can form PLTs in their schools or districts. Small rural districts will be encouraged to team with neighboring districts and communicate via distance-learning technology.

Application: Individuals will submit a personal statement describing teaching experience, interest in teaching PF, commitment to student learning, and a 3-year PD commitment.

Sec. VI.4. INSTITUTIONAL CAPACITY

MU is ideally situated to offer the Physics First Academy. Several faculty in this project (Drs. Chandrasekhar, Volkmann, and Manivannan) have extensive experience in offering PD in Physics. The Physics Department provides adequate instructional lab space, computer equipment, 16 inch reflecting telescope, as well as the expertise of internationally recognized scientists.

Sec. VI.5. EXPECTATIONS AND BENEFITS

Table VI. Profile of a Participating Science Teacher's Experience in the Academy	
Year 1. Expectations	Year 1. Benefits:

<ul style="list-style-type: none"> • May serve on Advisory Board • May serve on Curriculum Committee or curriculum writing teams • Attend 3-week summer academy at MU (90 hours) and 4 follow-up days (24 hours). • Teach at least half the content from academy, use pre/post-tests to assess student learning; document changes in students' understandings. • Participate in PLT: 2-4 week lesson-study (12 hours); review meetings monthly. • Meet 8 times/year with mentor/coach • Submit journal writings, student pre/post-test data via project web site. 	<ul style="list-style-type: none"> • Stipend of \$100/day for participation (\$1500 after summer academy, rest at end of school year); additional for Advisory Board and CC work. • 3 physics and one science education graduate credits to apply toward physics certification (tuition-free) • Equipment/materials kit for classroom use • Access to equipment on loan basis • Electronic / telephone / website access to project staff and resources • Support from PLTs and coach-mentor.
<p><i>Year 2: Same expectations as Year 1 plus:</i></p> <ul style="list-style-type: none"> • Submit proposal to a teacher society (NSTA, STOM, etc.) to present PF activities or research. 	<p><i>Year 2: Same benefits as Year 1 plus:</i></p> <ul style="list-style-type: none"> • Financial support to present and attend conferences.
<p><i>Year 3: Same expectations as Year 2, plus:</i></p> <ul style="list-style-type: none"> • Members of CC refine professional development packet for DESE. 	<p><i>Year 3: Same benefits as Year 2 plus:</i></p> <ul style="list-style-type: none"> • Stipend of \$110/day to reward increased participation and to encourage retention. • Recognition of 3-year commitment.

Sec. VI.6. Coordination with Existing Programs, Sustainability and Dissemination

This project is closely related to MU's SMAR²T and Robert Noyce Fellowship projects, which seek to recruit and prepare career changers to become certificated teachers. Contact between practicing teachers and novice SMAR²T teachers, provide invaluable networking prospects. Teachers will also influence other DHE-funded institutes, in content and through networking.

Sustainability: This project will change both participants and the partners. Teachers who teach PF over the 3 years will become confident and highly qualified teachers. Their protégés will gain from them. By educating highly qualified teachers, partners will build capacity and sustain PF.

Several activities seeded by this project will continue. Districts that implement PF will continue teaching the course. The RPDC will tap teachers to provide PD to other Missouri districts. The PD packet produced by the project can be used statewide. Both university partners plan to use PD materials for preservice secondary teachers. The web site will also be maintained past the project.

Changing federal and state budgets and priorities present difficulties in predicting future funding. The project team will seek MO-DHE Teacher Quality Improvement grants, and grants from federal agencies (National Science Foundation, and U.S. Department of Education). Districts may identify a part of their 1% PD budget to support PF. Administrators who attend the academy and who conduct walk-through evaluations in their districts are expected to be prime movers in this effort. MU faculty will aggressively seek funding to support the PF kit lending program from local and corporate donors.

Dissemination: Activities will be presented at NSTA²¹, AAPT²², and AETS²³ conferences and

submitted to journals such as the *Journal of College Science Teaching*, *American Journal of Physics*, and *The Science Teacher*. Project staff will work with DESE to disseminate PF curriculum.

Sec. VI.7. ALIGNMENT TO STATE CONTENT AND PROFESSIONAL DEVELOPMENT STANDARDS

Academy content will be aligned with the Show-Me Content and Process Standards and the MO-GLEs. This PD design aligns with the National Staff Development Council's Standards by promoting collaborative study groups that meet regularly during the school year. Studies of student work will provide data, monitor progress, and determine learning priorities. The academy will deepen teachers' knowledge in content and research-based strategies, and prepare them to use various assessments. The collaboration with Universities will enhance teachers' learning.

Sec. VI.8. RESEARCH BASE TO SUPPORT PROJECT

Physics-first has been gaining steam since 1995, spearheaded by Leon Lederman, a Physics Nobel Laureate. A framework was released by Project ARISE²⁴, which advocates the inversion of the standard biology-chemistry-physics teaching order²⁵. The logic for PF is that the "foundational" science,²⁶ physics, underlies all chemistry content, and together they support^{27, 28, 29} the biological sciences. Supporters declare that it gives science curricula a coherence that it currently lacks²⁷.

PF encourages conceptual physics in 9th grade, using hands-on inquiry methods that incorporate 5E and modeling cycles. The activity-oriented approach produces a successful first experience with high school science, and the logical sequence allows students to attain sophistication in biology³⁰.

The AAPT³¹ reports that PF promotes growth in enrollment in advanced courses, including 4th year and AP electives²⁷. Minorities and girls, being familiar with physics, are encouraged to take more sciences as they enter higher grades^{32, 33}. Math educators also support PF. The top achieving countries on TIMSS³⁴, like Scandinavia, teach physics every year starting in the 6th grade³⁵; 9th and 10th graders' performance compares well with seniors on the New York Regents exam.³⁶ PF allows immediate opportunities for students to practice their newly acquired algebra skills. In contrast, the traditional sequence produces a 3-year delay between 9th grade algebra and 12th grade physics³⁷.

Sec. VII. BIBLIOGRAPHY

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Sec. VIII. EVALUATION AND ACCOUNTABILITY PLAN

Evaluators will conduct a mixed-method, quasi-experimental evaluation of the project.

Guiding evaluation questions (aligned to project objectives) are

1. Does the project increase the number of teachers who are highly qualified to teach high school physics? (Objectives 2, 3)
2. What is the effect of the project on teachers' acquisition of knowledge of specified physics concepts? (Objectives 2, 3, 4)
3. What is the effect on student achievement in specified physics concepts of those teachers in the project as compared to those teachers not participating in the project? (Objectives 4, 5)
4. Does the physics curriculum designed align to Missouri GLEs, preparing students for science testing in grade 11? (Objective 1)

The evaluation process will consist of a formative and summative evaluation. The formative evaluation will involve tracking the process and components of project activities and outputs. The summative evaluation will document outcomes related to the project objectives and evaluation questions. Demographic data will be collected from the teacher and their status as a highly qualified teacher as defined by MO-DESE will be determined. Evaluators will follow teachers over the multi-year implementation of the project and document movement toward highly-qualified status. The Logic Model for the evaluation can be found in Table VII.

Evaluation Procedure

Preskill's Transformational Learning model, upon which this evaluation is based, provides the greatest opportunity for success in programs such as this.^a Evaluators will observe each type of project activity and prepare internal reports on evaluations and observations. They will analyze video-tapes of one lesson for each of the five mentoring groups. A focus group will be conducted with mentors once per year to document the mentoring process and teacher change from the mentor's perspective. The curriculum will be analyzed for alignment to the GLEs and the developmentally fitting inclusion of inquiry and technology based on the Missouri and National Science Standards and the National Technology Standards for Students. Evaluators will report to the project leadership team and to DESE twice yearly and will provide a final report at the end of each project year, including a summative three-year report at the end of year 3.

Formative Evaluation: This multifaceted project includes the planning, development and implementation of three summer institutes; follow-up and mentoring of teachers during the academic year; lesson study, analysis, and revision; the development of a PF-PD program, and the development of three curricula that can be used for PF within school districts. Evaluators will

attend a minimum of one of each of these activities, including three visits to the summer institutes, to document the process and quality of implementation of the project.

Summative Evaluation will focus on teacher acquisition of knowledge of physics concepts, inquiry, and use of technology and the use of that knowledge in developing and refining lessons, as well as student content acquisition in the physics concepts taught within the summer institutes.

Table VII. Evaluation Logic Model				
Evaluation Question	Objective	Indicator	Method of Evaluation	Source of Data
1. Does project increase the number highly qualified teachers?	2, 3	Increase in teachers who meet Missouri's highly-qualified definitions; increase in content knowledge through successful completion of university courses/certification	Analysis of teacher demographic data at the beginning of the project and at the end of each project year	Teacher demographic surveys; year-end surveys; Missouri highly-qualified guidelines; teacher videos
2. What is the effect of the project on teachers' acquisition of physics concepts?	2, 3, 4	Teachers' physics knowledge increases on pre/post FCI and CSEM instruments; teachers implement inquiry-based lessons, use technology and appropriate embedded assessments	Pre/post test score analysis for significant physics gain; Analysis of videotapes of physics concepts by select groups of teachers for inquiry, technology use and embedded assessments	Teacher scores from on-line data system; video tapes from teachers/mentors
3. What is the effect on student academic achievement in physics?	5	Student pre/post test gain scores of teacher in the treatment compared to those in the comparison group	Pre/post test scores analysis for significant differences in gain scores	Student scores obtained from on-line data system from each teacher
4. Does the curriculum align to GLEs?	1	Curriculum is aligned to GLEs in physics & inquiry	Examination of curriculum; comparison with GLEs for grades 9-12	Curriculum documents; Mo-GLEs

Instrumentation. The pre/post student tests will be developed during the summer academy along with the university faculty and the evaluators. Teachers will construct items they determine to be developmentally appropriate for a 9th grade physics student. The items will be reviewed by the university faculty for content and face validity. The evaluators will then review the items and administer the tests to 40-50 subjects (students of up to 3 teachers) as a test, and will retest within two weeks to assess the reliability of the test. Content validity is assumed as university faculty members involved with the physics PD training are monitoring test construction.

The pre/post teacher tests will be adapted from the Force Concept Inventory (FCI) in the first summer, and an instrument similar to the Conceptual Survey in Electricity and Magnetism in the second summer. These are nationally validated tests with wide usages and will provide a measure of the understanding of these physics concepts by the participating teacher^b. The adaptations will include the addition of problems involving calculations, a process not tested on

the FCI. A similarly rigorous test will be obtained for the third summer of heat, light, waves and sound content. Content and face validity of the test will be assumed as university content area professors are collaboratively constructing the tests. A test/retest process with 40 teachers will be run to determine reliability of the test. Validation of tests for all three years of content will be run in years 1 and 2 to get early information that will be useful to the CC.

Mentors will be using the *Inside the Classroom Observation and Analytic Protocol* from Horizon Research, Inc. This protocol has been used with national Mathematics and Science Partnerships (MSP) as the instrument of choice and will be applied to this MSP project. The *2000 National Survey of Science and Mathematics Education: Science Questionnaire* will be adapted to remove questions irrelevant to this project and will be administered each year.

Teacher. Teacher content acquisition will be evaluated through the validated pre/post tests. Pretest/posttest gain scores will be computed and tests for statistically significant differences will be applied. In addition, normalized gain scores will be computed to describe the gains as a function of potential gain for each individual^c.

Student. A non-random quasi-experimental design will be used to assess the effect on student academic achievement produced by teacher participation in the PF-PD (Table VIII). The students of 60 treatment teachers will be compared with those of ~ 20 comparison teachers in schools chosen based on school and teacher demographics, and on science MAP scores. Evaluators will seek comparison schools to match partners, and will work with project staff to recruit ninth grade physical science teachers who will administer pre/post tests before and after teaching that particular unit in their class. The project will provide incentives for participation.

Treatment and comparison teachers will administer the pre/post tests to their students before and after instruction on these concepts and will input the scores in a secure database for further statistical analysis.

Table VIII. Quasi-Experimental Evaluation Design				
Physics First Treatment:	NR	O ₁	X ₁	O ₂
Control Comparison:	NR	O ₁	X ₂	O ₂

NR	Indicates non-random assignment to group
O ₁	Unit pretest, must be given <u>prior</u> to classroom physics instruction
O ₂	Unit posttest, given within one week of classroom physics instruction
X ₁	Physics classroom instruction for students of teachers who participated in physics PD
X ₂	Physics classroom instruction for students of teachers who <u>did not</u> participate in physics PD

Analysis. The research model is a multilevel hierarchical model in which students are nested within classrooms which are nested within teachers. This model can analyze differences among students within classrooms (different sections) of the same teacher and provides a finer level of analysis than when using gross gain scores from an individual teacher. The model will test

whether there are differences in physics knowledge gain between students who had teachers in PF- PD vs. those who did not, while controlling for classrooms and teacher differences.

Dissemination of evaluation findings: Evaluation reports will be provided to the project team and partners twice yearly. An interim report to the team leadership will occur mid-year and a formal year-end report will be provided to the project participants identified by the leadership team. Informal communications will occur by phone and email on a regular basis and address emerging issues related to formative evaluation as well as ongoing project and project summative evaluation activities. The project leadership team will have responsibility for communicating the results outside of the project including joint articles and presentations that include the evaluation team.

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APPENDIX A

APPENDIX A. PARTNER - IDENTIFICATION FORMS AND LETTERS OF COMMITMENT

TABLE OF CONTENTS

Columbia Public School District (Columbia 93), Lead School District					
• Ms. Sara Torres, Science Coordinator					
K-12 School Districts (LEA) (non-publics included in count of prospective teachers)					
Name of District	% Free and Reduced Lunch	% of teachers not highly qualified	10 th grade Science MAP: % below proficient*	Number of non-publics in LEA	Estimated number of teachers (incl. non-public)
Carthage R-9	46.5		90	1	2
Columbia 93 (lead)	30.8		79.3	2	12
Christian Fellowship	NP ⁺				2
Ferguson-Florissant	54.3		94.7	2	6-10
Frances Howell	11		84	0	6
Hazelwood	34.2		97		6-10
Trinity Catholic	NP ⁺				2
Mehlville	21.6		92	0	6
Morgan R-II	55		94	1	2
Perry County	26.6	20	95.9	1	1
St. Vincent	NP ⁺				1
Seneca	44.1		94		2
Hickman Mills	64.9		83		15
Webb City	43.4		89	0	2
Total number of potential participants					65 - 73
University of Missouri-Columbia, lead institution of higher education;					
<ul style="list-style-type: none"> • Prof. Meera Chandrasekhar, Professor of Physics and Astronomy • Prof. Mark J. Volkmann, Associate Professor of Science Education • Prof. James Tarr, Assistant Professor of Mathematics Education • Prof. Dorina Kosztin Resident Instruction Assistant Professor of Physics and Astronomy 					
Missouri State University, additional institution of higher education;					
<ul style="list-style-type: none"> • Prof. Kandiah. Manivannan, Professor of Physics and Physics Education • Dr. James L. Puckett, Director of Missouri Virtual School (MVS) 					
State and Regional Educational Centers and Associations:					
<ul style="list-style-type: none"> • Heart of Missouri Regional Professional Development Center • Ozark Rural Systemic Initiative • St. Louis Regional Professional Development Center 					
Businesses:					
<ul style="list-style-type: none"> • Columbia Water and Light (CWL) 					
Non-profits:					
<ul style="list-style-type: none"> • Central Missouri Astronomical Society (CMAA) 					
Other Organization (Evaluation)					
<ul style="list-style-type: none"> • M.A. Henry Consulting 					

* includes *Nearing Proficient, Progressing and Step 1*

⁺ Non-publics in geographic location of LEA listed in previous line

APPENDIX A – PARTNER IDENTIFICATION FORM

Copy this form for each partner that is participating in this proposal.

PARTNERSHIP INSTITUTION

Carthage R-9 School District

NAME AND TITLE OF PRIMARY CONTACT

Dr. Gary Reed, Superintendent

ADDRESS (STREET ADDRESS, CITY, STATE & ZIP-CODE)

710 Lyon Street, Carthage, MO 64836

TELEPHONE NUMBER

417-359-7000

FAX NUMBER

417-359-7004

E-MAIL ADDRESS

reedg@carthage.k12.mo.us

TYPE OF INSTITUTION/ORGANIZATION

Public School District, K-12

DESCRIBE THE PARTNER'S MAIN ROLE IN THIS PROPOSAL

The Carthage R-9 School District will use the Math-Science Partnerships--Physics First to enhance our junior high and high school physics curriculum. The professional development provided by the program will improve teacher performance as well as student achievement. We hope to increase the numbers of students who will consider science as a career option and succeed in post-secondary education. Two of our teachers, Mike Turnbull and Jamie Horton, will attend the summer academy. At the administrative level we are committed to fully supporting our teachers in this program and providing all necessary materials and equipment.

APPENDIX A – PARTNER IDENTIFICATION FORM

Copy this form for each partner that is participating in this proposal.

PARTNERSHIP INSTITUTION

Columbia Public Schools

NAME AND TITLE OF PRIMARY CONTACT

Sara S. Torres, K-12 Science/Health Sciences Coordinator

ADDRESS (STREET ADDRESS, CITY, STATE & ZIP-CODE)

555 Vandiver Dr., Columbia, MO 65202

TELEPHONE NUMBER

573-214-2945

FAX NUMBER

573-214-3998

E-MAIL ADDRESS

storres@columbia.k12.mo.us

TYPE OF INSTITUTION/ORGANIZATION

Public School District, K-12

DESCRIBE THE PARTNER'S MAIN ROLE IN THIS PROPOSAL

Columbia Public School district will serve as the lead school district. As the lead school district, our role will be:

- * To act as the administration/fiscal agent for the project.
- * To coordinate the development of the Professional Development Physics First academy.
- * To coordinate the follow-up sessions.
- * To coordinate the curriculum packet for DESE.
- * To send three teams (minimum of 2 teachers per team) to the summer academies and follow-up sessions.
- * To set up professional learning teams to share the knowledge with teachers who could not attend the summer academies.
- * To assist in the development of student assessments.



COLUMBIA PUBLIC SCHOOLS

ADMINISTRATION BUILDING
Page 2

Dr. Phyllis A. Chase
Superintendent of Schools

September 28, 2005

Mr. Craig Rector, Director
MO DESE
Federal Discretionary Grant
PO Box 480
205 Jefferson Street
Jefferson City, MO 65102

Dear Mr. Rector:

The Columbia Public School District is pleased to have the opportunity to partner with the University of Missouri – Columbia, Missouri State University and other school districts across the State of Missouri in the Missouri High School Science Reform Initiative. Specifically, Columbia Public Schools role and contribution to the partnership will be:

- ❖ To serve as the lead school district that will act as the administration/fiscal agent for the project.
- ❖ To coordinate the development of the Professional Development Physics First academy, follow-up sessions, and curriculum packet for DESE.
- ❖ To participate in teacher professional development.
- ❖ To assist in the development of student assessments.

Through participating in the above activities, Columbia Public Schools will be addressing our board goals, which include:

1. Increase student achievement
2. Eliminate achievement disparities between groups of students
3. Maximize resources efficiency

Columbia Public Schools has taught a combined Physics and Chemistry course for 9th grade. Beginning in 2006-07, we plan to teach Physics First in 9th grade. Teachers that attend the summer academy will be mentors for fellow teachers in Columbia Public Schools as we implement the new curriculum. The science/health coordinator will support the participants through district wide workshops and curriculum writing team time.

Through the initiative, our teachers will gain expertise in curriculum development and implementation to help student achieve in science. In 2003, 79.3% of our 10th grade students scored below proficient on the Science portion of the MAP. Additionally, 30.8% of our student population participates in the free/reduced lunch program. Therefore, Columbia Public Schools is considered a high needs district based upon the criteria of the RFP for the Missouri High School Science Reform Initiative.

Columbia Public Schools is committed to the high school science reform initiatives expressed in this grant. We will sustain the initiative following the grant cycle through district wide collaboration and building professional learning teams.

Sincerely,

Phyllis A. Chase
Superintendent

PAP/lrc

APPENDIX A – PARTNER IDENTIFICATION FORM

Copy this form for each partner that is participating in this proposal.

PARTNERSHIP INSTITUTION**Christian Fellowship School (CFS)****NAME AND TITLE OF PRIMARY CONTACT****Jack W. Richens, Jr. Science Department Chairperson****ADDRESS (STREET ADDRESS, CITY, STATE & ZIP-CODE)****4600 Christian Fellowship Road Columbia MO 65203****TELEPHONE NUMBER****573-445-8565****FAX NUMBER****573-445-8564****E-MAIL ADDRESS****mrrichens@cfsknights.org****TYPE OF INSTITUTION/ORGANIZATION****private K-12 school****DESCRIBE THE PARTNER'S MAIN ROLE IN THIS PROPOSAL****CFS staff are available to**

- participate in curriculum development
- participate in summer academy planning
- participate in the summer academies
- serve as mentors to classroom teachers



Home of the Knights

CHRISTIAN FELLOWSHIP SCHOOL

4600 Christian Fellowship Rd. • Columbia, Missouri 65203
Ph: (573) 445-8565 • Fax: (573) 445-8564 • Email: principal@christianfellowship.com

September 29, 2005

Sara Torres
Science/Health Coordinator
Columbia Public Schools
555 Vandiver Road
Columbia, MO 65202

Ms. Torres,

On behalf of Christian Fellowship School (CFS) I would like to accept your invitation to become a partner in the Math-Science Partnerships: Physics First Project. As I stated at the planning meeting on September 8th the high school science sequence at CFS has been "Physics First" since the fall 1999, and we maintain a high level of interest in and commitment to the Physics First concept.

CFS, as a partner in this project, is willing to commit to

- assisting in curriculum development,
- assisting in planning of the summer academies,
- sending teachers (2) to the summer academies, and
- mentoring teachers new to the "Physics First" concept.

Thank you for the opportunity to join this project and our inclusion in its planning. Though I hope for the success of this proposal, CFS will continue, regardless of the outcome, to offer a Physics First curriculum and would be willing to assist other schools desiring to adopt this approach to secondary science curriculum.

Jack W. Richens, Jr.
Science Department Chairperson

APPENDIX A – PARTNER IDENTIFICATION FORM

Copy this form for each partner that is participating in this proposal.

PARTNERSHIP INSTITUTION

Ferguson-Florissant School District

NAME AND TITLE OF PRIMARY CONTACT

Jeffrey R. Spiegel, Superintendent

ADDRESS (STREET ADDRESS, CITY, STATE & ZIP-CODE)

1005 Waterford Dr, Florissant, MO 63033-3694

TELEPHONE NUMBER

(314)506-9004

FAX NUMBER

(314)506-9010

E-MAIL ADDRESS

jspiegel@fergflor.k12.mo.us

TYPE OF INSTITUTION/ORGANIZATION

Public

DESCRIBE THE PARTNER'S MAIN ROLE IN THIS PROPOSAL

Our role includes involvement in the professional development planning process and providing participants for the grant activities.



Ferguson-Florissant School District

Jeffrey R. Spiegel, Superintendent of Schools

1005 Waterford Drive • Florissant, Missouri 63033-3694

(314) 506-9004 • FAX (314) 506-9010

e-mail: jspiegel@fergflor.k12.mo.us

Website: www.fergflor.k12.mo.us

September 15, 2005

**Sara S. Torres
K-12 Science & Health Coordinator
Columbia Public Schools
555 Vandiver Drive
Columbia, Missouri 65202**

Dear Ms. Torres:

The Ferguson-Florissant School District welcomes the opportunity to partner with the University of Missouri-Columbia and Columbia Public Schools in the Math-Science Partnership Grant. The district has always been committed to science education, as evidenced by our outstanding staff and resources, including the Challenger Learning Center, located on the campus of McCluer South-Berkeley High School, and Little Creek Nature Area, a 97-acre preserve that serves as an outdoor classroom for district Pre K-12 science students. Our past and current partnerships in initiatives of this type have provided excellent professional development and resource opportunities for our teachers.

Ferguson-Florissant faces a number of challenges as a large urban district, including a high rate of student mobility - as much as 30% in recent years. Minorities are represented by approximately 70% of our student population and 54.3% participate in the free/reduced lunch program. While several of our schools' test scores on the Grade 3 Science MAP are among the highest in the state, student scores on the Grade 10 Science MAP have flattened in recent years, with just 5.3% of students scoring at the proficient or advanced level in 2004.

These scores, along with the introduction of the Science Grade Level Expectations in Spring 2005 and the pending change of the high school Science MAP to Grade 11, present us with both challenges and opportunities as we look for ways to increase and sustain higher levels of student performance. One way we are addressing these challenges is the introduction of a "Physics First" science course sequence for high school students, to be implemented in Fall 2006. We believe that this sequence represents a more realistic approach to the continuum of concept development needed for a deeper understanding of science, and will provide our students the rigor needed for greater success on standardized assessments and post-secondary academic pursuits. It's clear that the success of this

initiative lies with the quality of the professional development, mentoring, and resource support available to our teachers, and this grant partnership will afford us significant opportunities in these areas.

Our inclusion in the planning process has assured us that the needs of our staff and students will be well represented should the grant be funded. We have identified ten Grade 9 science teachers in need of the collaborative and sustained professional development and mentoring included in the grant plan. Our identified needs are both in the area of increased subject matter knowledge and the effective methodology for addressing physics with the 9th grade student. Our teachers are eager for the opportunity to participate and committed to the success of this initiative.

The Ferguson-Florissant School District has earned a national reputation as an innovative educational leader, and our staff is working continually to provide the highest quality instructional program for our students. We are committed to the initiatives represented by this grant as well, and will work to sustain them once the grant cycle is complete. This letter also serves to certify that any funding received through this grant will not replace any funding the district currently uses for science and math education.

Sincerely,

A handwritten signature in dark ink, appearing to read "Jeff R. Spiegel". The signature is fluid and cursive, with the first name "Jeff" and last name "Spiegel" clearly distinguishable.

Jeffrey R. Spiegel
Superintendent of Schools

APPENDIX A – PARTNER IDENTIFICATION FORM

Copy this form for each partner that is participating in this proposal.

PARTNERSHIP INSTITUTION

FRANCIS HOWELL SCHOOL DISTRICT

NAME AND TITLE OF PRIMARY CONTACT

SHARON WALL, SCIENCE CURRICULUM SPECIALIST

ADDRESS (STREET ADDRESS, CITY, STATE & ZIP-CODE)

4545 CENTRAL SCHOOL RD. ST. CHARLES, MO 63304

TELEPHONE NUMBER

(636) 851-4074

FAX NUMBER

(636) 851-4090

E-MAIL ADDRESS

sharon-wall@fhds.k12.mo.us

TYPE OF INSTITUTION/ORGANIZATION

PUBLIC SCHOOL DISTRICT

DESCRIBE THE PARTNER'S MAIN ROLE IN THIS PROPOSAL

SEE ATTACHMENT

DESCRIBE THE PARTNER'S MAIN ROLE IN THIS PROPOSAL:

The Francis Howell School District will enter into a partnership with Columbia Public Schools as part of the proposal for Title II, Part B, Mathematics and Science Partnership Program: Missouri High School Science Reform Initiative.

The Francis Howell School District's will take an active role in partnership with Columbia Public schools to facilitate the following professional development and planning initiatives to improve instructional practices and enhance student learning in the area of science:

- Design and implementation of summer academies to provide professional development to high school physical science teachers.
- Provide district representation on the Advisory Board and Curriculum Committee. This representation would involve district administrators and/or science teachers.
- Allocate time for the district science curriculum specialist to serve as the Francis Howell District liaison with Columbia Public School. The Francis Howell science curriculum specialist will be responsible for all internal paperwork and communication with the partnership.
- Promote participation in summer academies and provide ongoing communication with Francis Howell teachers regarding professional development opportunities provided by the grant.

The Francis Howell School District views the partnership with Columbia Public Schools as a valuable opportunity to support upcoming curricular changes that will impact our students for years to come. The Francis Howell School District has decided to increase science graduation requirement to three full credits beginning with the class of 2010. The freshman class of 2006 will follow a required sequence of physical science, biology, and chemistry. Physical science curriculum is currently being revised to align with state grade level expectations with emphasis on inquiry and technology integration. A district math specialist will be working with the curriculum committee to identify alignment of mathematic skills with the physics content. This interdisciplinary collaboration is designed to facilitate development of tighter alignment of similar objectives and to foster application of these skills. The curriculum will have a strong conceptual physics focus. Participation in the Columbia Public Schools professional development project will help to build teachers' understanding of inquiry-based learning as well as their knowledge of key science content.

The Francis Howell Curriculum Development Process requires the development and implementation of a professional development plan integral to supporting new curriculum. As the district engages in major revisions of our current science curriculum to meet the demands of a more rigorous science curriculum at the high school level, the professional development focus will be on increasing science content knowledge for teachers and providing strong instructional models to build teachers' ability to effectively integrate inquiry-based methodology supported by technology into instruction. The district welcomes the opportunity to partner with Columbia Public Schools in this professional development effort.

Close browser when finished.

1 / 1

Main Report

100%

Missouri Department of Elementary and Secondary Education
School Improvement / Federal Programs
Nonpublic Registration Form Information

Report Number: FGM301R
Report Generated: 9/26/2005 8:51:59AM
Data as of: Fall 2005

No schools meet the selection criteria

Report Summary

Number of schools displayed: 0
Total enrollment for schools displayed: 0

The following parameters were used in the generation of this rep

School Type(s): ALL
Boarding School Indicator(s): ALL
Enrollment Grade(s): ALL
Counties: ST.%20CHARLES
Public District(s): 092088
Legislative District(s): ALL
Grades Served : High School

To print entire report use printer button icon located above the report title.

Note: The final page of this report contains a summary of the report data along with the parameters used to generate this report.



FRANCIS HOWELL SCHOOL DISTRICT

4545 Central School Road • St. Charles, MO 63304-7113

636-851-4000 • FAX 636-851-4093

www.fhds.k12.mo.us

Daniel E. O'Donnell, Ed.D.

Superintendent of Schools

September 26, 2005

636-851-4026

FAX 636-851-4087

dan_odonnell@fhds.k12.mo.us

To Whom It May Concern:

Please accept this letter as full endorsement of the Columbia Public Schools proposal for the competitive grant under Title II-B Mathematics and Science Partnership Program: Missouri High School Science Reform Initiative. The Francis Howell District is eager to participate with Columbia Public Schools as a partner in this important professional development effort.

The Francis Howell School District is currently involved in a major curriculum revision targeting freshman physical science with a physics emphasis. This curriculum revision is being done in response to a district decision to increase graduation requirements for science to three full credits and to develop a tighter alignment with the newly adopted Missouri Grade Level Expectations for Science. The district recognizes that the changes to the curriculum and to the graduation requirements will necessitate a comprehensive professional development effort to build our teachers' capacity to use inquiry-based methodology to help students understand and apply key scientific concepts. The project proposed by Columbia Public Schools offers an outstanding opportunity for Francis Howell teachers to participate in high quality professional development leading to improved student achievement in science.

The Francis Howell School District identified science as an area of need based on a review of MAP performance data indicating that fully 83.8% of high school students fell below the state proficiency standards in 2005. A more comprehensive review of data over the past five years indicates that substandard performance in science at the high school level is a long-term trend with the percent of students falling below proficiency ranging from 83.8% to 90.5% over the period. These results are of great concern to Francis Howell, and the opportunity to partner with Columbia Public Schools to help address these issues through effective professional development and collaboration will most certainly be an outstanding asset to both districts for years to come.

Thank you for your consideration of the Columbia Public Schools Title II-B grant proposal.

Sincerely,

Dr. Daniel O'Donnell
Superintendent

**Francis Howell School District
High School Science Reform Project
Partnership Information**

Page 6

Sec. V.1. Our Partner School Districts and their profiles

Partner School District	%FRL	% teaching outside field	% below proficient – 10 th grade science MAP	# potential Participants
Francis Howell School District	11%	See below	83.8%	6 – 10*

Teacher Certification:

17 Physical Science teachers

10 General Science certification

3 Unified Science (Biology) certification

1 Unified Science (Chemistry) certification

2 Physics certification

1 Pending certification (paperwork being processed)

*the dates will be a big factor in the decisions

APPENDIX A – PARTNER IDENTIFICATION FORM

Copy this form for each partner that is participating in this proposal.

PARTNERSHIP INSTITUTION

HAZELWOOD SCHOOL DISTRICT

NAME AND TITLE OF PRIMARY CONTACT

SUSAN RANEY, SCIENCE COORDINATOR

ADDRESS (STREET ADDRESS, CITY, STATE & ZIP-CODE)

13780 OLD HALLS FERRY ROAD, FLORISSANT, MO 63031

TELEPHONE NUMBER

(314) 953-5082

FAX NUMBER

(314) 953-5111

E-MAIL ADDRESS

sraney@hazelwoodschoools.org

TYPE OF INSTITUTION/ORGANIZATION

PUBLIC SCHOOL DISTRICT

DESCRIBE THE PARTNER'S MAIN ROLE IN THIS PROPOSAL

- . To participate in teacher professional development to increase subject matter knowledge and teaching skills of teachers.
- . To participate in reflective sustained professional development follow-up activities and in-class mentoring and coaching.
- . To assist in the design and implementation of a conceptual physics curriculum at the ninth grade level.

September 28, 2005

Sara Torres
Science Coordinator
Columbia Public Schools
555 Vandiver Dr.
Columbia, MO 65202

Dear Sara Torres,

The Hazelwood School District is eager to collaborate with the Columbia Public Schools, the University of Missouri – Columbia, Missouri State University and other school districts across the State of Missouri in the Missouri High School Science Reform Initiative. Specifically, Hazelwood School Districts' role and contribution to the partnership will be:

- ❖ To participate in teacher professional development to increase subject matter knowledge and teaching skills of teachers.
- ❖ To participate in reflective sustained professional development follow-up activities and in-class mentoring and coaching.
- ❖ To assist in the design and implementation of a conceptual physics curriculum at the ninth grade level.

Teachers that attend the summer academy will be mentors for fellow teachers in the Hazelwood School District. The science coordinator will support the participants through district wide workshops and curriculum writing.

The Hazelwood School District has a diverse student population (57.10% African American and 40.80% white). Our student population includes 34.20% of students who are eligible for free and reduced lunch and in 2004, 68.6% of Hazelwood School District 10th grade students scored in the bottom two levels of the Science MAP. Therefore, Hazelwood School District is considered high needs district based upon the criteria of the RFP for the Missouri High School Science Reform Initiative.

Our commitment to curriculum revision includes funds budgeted for study, production, and purchase of materials and equipment to implement new curriculum, along with funds budgeted to provide professional development opportunities for teachers. We will sustain the initiative following the grant cycle through district wide collaboration and the building of professional learning teams. We look forward to the prospect of collaborating to address the initiatives articulated in the Missouri High School Science Reform Initiative proposal, while at the same time addressing the critical needs outlined by our district. Best wishes for a successful review process.

Sincerely,

APPENDIX A – PARTNER IDENTIFICATION FORM

Copy this form for each partner that is participating in this proposal.

PARTNERSHIP INSTITUTION

Hickman Mills School District

NAME AND TITLE OF PRIMARY CONTACT

Grace Ann Ancona

ADDRESS (STREET ADDRESS, CITY, STATE & ZIP-CODE)

9000 Old Santa Fe Road, Kansas City MO 64138

TELEPHONE NUMBER

816.316.7030

FAX NUMBER

816.316.7020

E-MAIL ADDRESS

gracea@hickmanmills.org

TYPE OF INSTITUTION/ORGANIZATION

Public School District

DESCRIBE THE PARTNER'S MAIN ROLE IN THIS PROPOSAL

- . Support 9th grade science teachers participation in the Physics First program. This will include encouraging teachers to apply to participate to the cohort(s) of the Physics First Academy and clinical learning experiences.
- . Ensure that building and curriculum administrators participate in the administrator component of professional development so they will be able to support their teachers and assist with curriculum development.
- . We will attend general informational meetings.
- . Create opportunities for our participating teachers to collaborate with other participants.
- . Work with our business community to secure additional partners to collaborate with our participating teachers.
- . Create opportunities for participating teachers to provide leadership/mentoring experiences for other science teachers in their building regarding Physics First.
- . Provide data for the project evaluation.
- . Support participating teachers involvement in the Physics First - Critical Friends Network.
- . Participate in the Physics First Advisory Council.

Partner Signature:

Dr. Grace Ann Ancona

Date:

12-20-05

APPENDIX A – PARTNER IDENTIFICATION FORM

Copy this form for each partner that is participating in this proposal.

PARTNERSHIP INSTITUTION

Mehlville School District

NAME AND TITLE OF PRIMARY CONTACT

C. J. Evans, Math/Science Director

ADDRESS (STREET ADDRESS, CITY, STATE & ZIP-CODE)

69 Randolph Place St. Louis, MO 63125-4132

TELEPHONE NUMBER

314-467-7831

FAX NUMBER

314-467-7896

E-MAIL ADDRESS

evanscj@mehlville.k12.mo.us

TYPE OF INSTITUTION/ORGANIZATION

Public School District

DESCRIBE THE PARTNER'S MAIN ROLE IN THIS PROPOSAL

Mehlville will send 2 teams of teachers to the Summer Institutes at the University of Missouri and to the four Saturday follow-ups.

Mrs. C. J. Evans, our Math/Science Director, will work with the University of Missouri to support this proposal and collaborate with the teacher teams during the school year. After the first summer institute, Mehlville School District will organize study groups of teachers to meet several times during the year to learn from those who attended the institute.

Mehlville School District



Where Tradition Meets Vision

Central Office

Timothy A. Ricker, Ed.D.
Superintendent
rickert@mehlville.k12.mo.us

September 15, 2005

Professor Meera Chandrasekhar
Physics Department
University of Missouri-Columbia
Columbia, MO 65211

Dear Professor Chandrasekhar:

With the advent of the new Missouri Grade-level Expectations in science, all school districts are re-aligning their curriculum to incorporate these expectations. Working with the University of Missouri on the Math/Science Partnership: Physics First program will give us a boost in this process and help our teacher teams learn how the expectations will impact their classrooms and gain the knowledge and pedagogy to implement those expectations.

Mehlville School District will provide two teams of teachers, chosen from the 9-12 grade levels, to participate in this grant. At the three summer institutes, those teachers will gain expertise in curriculum development and assessment writing and then; throughout the year, provide workshops to our science teachers helping to improve student achievement on the new science MAP.

Two of the goals of our Comprehensive School Improvement Plan are to raise the student achievement on the MAP and close the achievement gap among our ethnic groups. The expertise our teacher teams will gain from participating in this partnership will help the district attain those goals.

The district will assemble teacher teams to participate in the summer institutes and the follow-up Saturday meetings. Our Science Director will hold regular meetings with these teams to learn from them, help them set up district workshops, and find how the district could better support them. They will be our "teacher leaders" in implementing an innovative curriculum that will increase student achievement.

Sincerely

Tim Ricker, Ed.D.
Superintendent of Schools

APPENDIX A – PARTNER IDENTIFICATION FORM

Copy this form for each partner that is participating in this proposal.

PARTNERSHIP INSTITUTION

Morgan County R-II School District (071-092)

NAME AND TITLE OF PRIMARY CONTACT

Joyce Ryerson, Assistant Superintendent

ADDRESS (STREET ADDRESS, CITY, STATE & ZIP-CODE)

913 W. Newton, Versailles, MO 65084

TELEPHONE NUMBER

(573) 378-2656

FAX NUMBER

(573) 378-5714

E-MAIL ADDRESS

jryerson@mcr2.k12.mo.us

TYPE OF INSTITUTION/ORGANIZATION

Public School District (071-092)

DESCRIBE THE PARTNER'S MAIN ROLE IN THIS PROPOSAL

The Morgan County R-II School District will be involved with the planning and implementation of the Physics First Partnership Program. The district will send representative(s) to all planning meetings to ensure that measurable objectives and annual targets, which describe progress toward meeting the goals and objectives established will reflect the response to a comprehensive needs assessment. The district will ensure through the planning stages that measurable objectives and annual targets result in a reduction of the number of teachers who do not meet the definition of “highly qualified teacher”.

The Morgan County R-II School District will ensure through participation in the planning process that measurable objectives are developed to increase the number of science teachers who participate in content-based professional development activities. In addition, the district will ensure that measurable objectives have been established for improved student academic achievement on Missouri science assessments. Finally, district will participate in the curriculum development process for planning of the summer institutes and any assessment work resulting from this process.

The Morgan County R-II School District will recruit instructors in teams of two or more, to attend the 3-week institutes and the 4 follow-up Saturdays at the University of Missouri-Columbia. These instructors will represent grades 9 –12 at the institute. The district will support instructors attending the institutes in their work with study groups of other educators from the district for at least 12 hours per school year. Topics for discussion will include but is not limited to: student work samples, evidence of learning, misconceptions, etc.. In addition, the district assures that all journal writings, pre and post-test data will be submitted for review.

The Morgan County R-II School District will ensure that instructors will teach at least two units of science content from the institute and will use pre and post-testing to assess student learning. The district will ensure participating instructors document change in students’ conceptions and understandings. The district will ensure that instructors in the program will participate in classroom observations twice each year by Project Coordinator and/or team faculty.

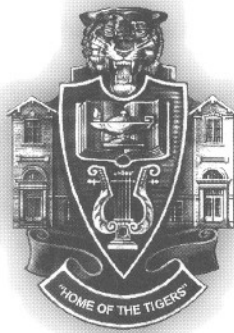
The Morgan County R-II School District will coordinate efforts with the Columbia Public School District in providing necessary fiscal information. All budgetary considerations will be coordinated through the Columbia Public School District and with all other program partners. The Morgan County R-II School District is committed to maintaining targeted activities beyond the grant period and will continue to look at other local, state, and federal funding sources for additional ways to continue these activities.

Morgan County R-II School District

913 West Newton • Versailles, Missouri 65084

"An A+ School"

Jeffery B. Carter
Superintendent
Phone: 573/378-4231
Fax: 573/378-5714
e-mail: jeff@mcr2.k12.mo.us



Joyce Ryerson
Assistant Superintendent
Phone: 573-378-2656
Fax: 573-378-5714
e-mail: jryerson@mcr2.k12.mo.us

September 29, 2005

Ms. Sara Torres
Science/Health Coordinator
Columbia Public Schools
555 Vandiver Dr.
Columbia, MO 65202

Dear Sara:

The Morgan County R-II School District in Versailles, Missouri is interested in participating in the Physics First Partnership Program. Being located in rural central Missouri, some professional development opportunities are limited for us. We believe this initiative will provide excellent professional development services in the concept of Physics First to our high school science teachers, wherein we are working to improve student performance.

The Morgan County R-II School District assures the Columbia Public School District along with the other program partners that we shall recruit instructors in teams of two or more, to attend the 3-week institutes and the 4 follow-up Saturdays at the University of Missouri-Columbia. The district will support instructors attending the institutes in working with study groups of other educators in order to discuss: student work samples, evidence of learning, misconceptions, etc. for at least 12 hours per school year. In addition, the district assures that all journal writings, pre and post-test data will be submitted for review.

In the Comprehensive School Improvement Plan of the Morgan County R-II School District, Goal 2 states *"The Morgan County R-II School District MAP scores will increase as measured by the MAP Performance Index"*. Strategies that correlate to this goal include: the district will provide research based programs to maximize student learning and the district will provide instructional training/assessment to enhance student performance based on MAP format. The Physics First Partnership Program will add an additional dimension to completing these action steps.

The 2003-2004 school year brought a series of professional development areas to the Morgan County R-II High School science department including: curricular work to align curriculum with the frameworks, summer workshops to align learning activities and assessments to curriculum, workshops requiring instructors to focus on the most consistently low-scoring areas and to search out activities to improve these areas, and frequent meetings with a curriculum specialist to look for suggested activities and assessments. The 2005-2006 school year at the Morgan County R-II School District is being focused toward aligning the science curricula with the Missouri Grade Level Expectations. Part of this alignment includes revisiting the sequence of classes offered in the high school.

The Mathematics and Science Partnership Program will benefit the students and instructors of the Morgan County R-II School District. Instructors will gain the benefit of making connections in higher education and in other school districts that will serve as valuable resources for creating innovative strategies in order to increase student performance, specifically in the area of 9th grade science education. Students will benefit from the enhanced curricular strategies employed in the classroom.

Please consider our letter of commitment to this worthwhile venture.

Sincerely,


Dr. Joyce Ryerson
Assistant Superintendent

APPENDIX A – PARTNER IDENTIFICATION FORM		
Copy this form for each partner that is participating in this proposal.		
PARTNERSHIP INSTITUTION		
Perry County School District #32 (Perryville High School)		
NAME AND TITLE OF PRIMARY CONTACT		
Dr. Steve Wolf High School Principal		
ADDRESS (STREET ADDRESS, CITY, STATE & ZIP-CODE)		
326 College Perryville MO 63775		
TELEPHONE NUMBER	FAX NUMBER	E-MAIL ADDRESS
573-547-4727 x 242	573-517-0592	swolf@perryville.k12.mo.us
TYPE OF INSTITUTION/ORGANIZATION		
public high school		
DESCRIBE THE PARTNER'S MAIN ROLE IN THIS PROPOSAL		
<p>The main roles of Perryville High School will be:</p> <p>To participate as a partner in the teacher professional development</p> <p>To help design the curriculum used for "Physics First",</p> <p>To assist in the development of the assessments used, and</p> <p>To serve as a mentor to other area schools wishing to participate at a later time.</p>		

Perry County School District No. 32

College at Edwards Street

Perryville, Missouri 63775-2699

September 16, 2005

Ms. Sara Torres
Columbia Public Schools
1818 W. Worley St.
Columbia, MO 65203-1038

Dear Ms. Torres:

This document will communicate our commitment to participating as a partner in the Missouri High School Science Reform Initiative. Specifically, our role and contribution to the partnership will be:

- To assist in the development of curriculum.
- To participate in teacher development.
- To assist in the development of student assessments.
- To serve as a mentor for area schools wishing to participate at a future date.
- To increase the number of certificated physics teachers in our school district.

These activities heretofore identified are integral to Perry County School District #32's instructional mission in the following ways:

- Increase student success in math and science through increasing our academic rigor.
- Increase the number of students taking upper level math and science classes.
- Increase our students' opportunities to be successful in post high school educational pursuits.
- Increase the professional development opportunities for our teachers in areas of both content and pedagogy.

We are encouraged by the opportunity to participate in this reform initiative for the purpose of increasing knowledge and skills of science teachers, as well as improving the learning of our students.

Sincerely,



Beverly Schonhoff
Superintendent of Schools

BKS:bmh

"Education Designed to Improve the Quality of Life"

APPENDIX A – PARTNER IDENTIFICATION FORM

Copy this form for each partner that is participating in this proposal.

PARTNERSHIP INSTITUTION

Webb City R-7 School District

NAME AND TITLE OF PRIMARY CONTACT

Renee' Close Goostree

ADDRESS (STREET ADDRESS, CITY, STATE & ZIP-CODE)

411 N. Madison, Webb City, Mo. 64870

TELEPHONE NUMBER

(417) 673-6000

FAX NUMBER

(417) 673-6007

E-MAIL ADDRESS

rgoostree@mail.wccards.k12.mo.us

TYPE OF INSTITUTION/ORGANIZATION

Public School

DESCRIBE THE PARTNER'S MAIN ROLE IN THIS PROPOSAL

The Webb City R-7 School District has a commitment to improve student learning by studying the most current research on effective teaching and then focusing on the professional development of it's teachers. We have found that our science and math achievement has increased over the last 6 years as our teachers have improved their pedagogy and content knowledge. We have had our principals and science teachers trained at the LASER Institute in Washington, D.C., in Colorado at the BSCS Institute, as well as locally through the National Eisenhower grant secured by Southwest Center for Educational Excellence. The results have been so positive that we wish to continue in our instructional learning as a partner in the Physics First Grant.

Our role as a partner in the Physics First grant would be to:

- * train 2 teachers in the Physics First program at the summer academies and follow-up sessions
- * improve pedagogy in the area of inquiry teaching and learning
- * deepen teacher understanding of physics concepts
- * collaborate with a larger group of teachers that are outside our immediate area who are dedicated to science reform and improving classroom instruction
- * work with a local mentor who will model, critique, and coach effective methodology for 9th grade physics
- * participation in building administrator training
- * purchase and implement conceptual physics materials to support professional development and student instruction
- * evaluate not only student progress but also teacher expertise
- * encourage and provide information on the Physics First program to non-participant districts in our area of the state

Webb City Schools has been the first district in southwest Missouri to implement many research-based, reform math and science curricula. With a high school population of thirty-seven percent qualifying for free and reduced lunch, we have found that using the inquiry methodology has increased student interest in science and achievement. We look forward to being a partner in the grant and the improved achievement of our students.

Webb City School District R-7

411 North Madison * Webb City, Missouri 64870

"Striving to Prepare Today's Youth to Meet the Challenges of Tomorrow's World"

417/673-6000 417/673-6007(Fax)

Toby Bottom

Associate Superintendent
Support Services

Dr. Ronald Lankford

Superintendent of Schools

Renee C. Goostree

Associate Superintendent
Instructional Services

September 29, 2005

Letter of Commitment: Physics First Partnership

The Webb City R-7 School District has a long-term, focused mission to improve student achievement, especially in the areas of math and science. We have been heavily involved in math and science reform for the past 6 years. Our principals and teachers have been attending professional development pertaining to the need for instructional reform and training to use new curricula and inquiry methodology. Our district teachers have formed study groups to review TIMSS findings, and our administrative study group has read *The Teaching Gap* to gain a better understanding of sound math and science instruction.

During the study of instructional reform it became obvious to teachers and administrators that we could not dismiss the facts showing the learning benefits for students when new methods and curricula were implemented. We have adopted several reform programs for grades K-12 and spent an immense amount of time in the study of pedagogy and improving teacher understandings of content. The changes were not easy but we have moved through the implementation curve and found that our hard work has improved student learning. More specifically, at the high school level we have implemented *Core Plus* math and *CPO Foundations of Physical Science*. Through these efforts we have seen greater student achievement and greater satisfaction for teachers with the teaching process.

Please let this letter serve as a statement of our commitment to our students, to the foundation of reform in math and science instruction, and to the belief that professional development is the key to improving student learning. We would like be a participant in the Physics First Partnership.

Sincerely,



Renee' Close Goostree
Associate Superintendent

APPENDIX A – PARTNER IDENTIFICATION FORM

Copy this form for each partner that is participating in this proposal.

PARTNERSHIP INSTITUTION: University of Missouri-Columbia

NAME AND TITLE OF PRIMARY CONTACT : Meera Chandrasekhar

ADDRESS (STREET ADDRESS, CITY, STATE & ZIP-CODE)

601 College Avenue, Department of Physics and Astronomy, University of Missouri, Columbia MO 65211

TELEPHONE NUMBER

573-882-2619

FAX NUMBER

573-882-4195

E-MAIL ADDRESS

meerac@missouri.edu

TYPE OF INSTITUTION/ORGANIZATION Public University

DESCRIBE THE PARTNER'S MAIN ROLE IN THIS PROPOSAL

Three MU faculty members will contribute to this partnership. Their expertise and roles are described below:

Dr. Meera Chandrasekhar will serve as co-PI of the project and one of two content experts. She is a Curator's Distinguished Teaching Professor and Professor in the Department of Physics and Astronomy at the University of Missouri Columbia. She was a recipient of the Presidential Award for Excellence in Science, Mathematics and Engineering Mentoring (1999), and has received the Kemper Fellowship (MU, 1997) and Governor's Award for Teaching (1998). She has an active research program in the optical spectroscopy of condensed matter systems, and has a strong background and experience in the education of K-12 students and teachers. She has been the PI of four grants totaling \$1.3 million from the National Science Foundation, including *Experiment Based Physics for Girls in Elementary Schools* and *Promoting Young Women in the Physical Sciences* in collaboration with Rebecca Litherland, which focused on extra-curricular and inservice programs for 5-12 grade teachers, students and parents. She has also been the PI of several grants for inservice summer institutes in physics and physical science (1993-2005), funded by the Eisenhower Professional Development Program and the Teacher Quality Improvement, in collaboration with Mark Volkmann and others. These collaborations have resulted in several publications, including a CD-ROM on Electricity and Magnetism for middle grades.

Project role: Dr. Chandrasekhar will provide overall coordination for the MU part of this partnership, and will be the lead higher education liaison. She will be primarily responsible for teaching one section of the physics content in the summer academy using the curriculum developed by the curriculum committee. She will be responsible for the day-to-day decisions of the higher-ed partners, pricing and ordering of equipment and materials for the academy. She will oversee grant accounts for the MU partner, which includes equipment, onsite expenses and coach-mentors.

Dr. Mark Volkmann Associate Professor of Science Education, will serve as the science education expert. A former junior high school and high school science teacher, Volkmann has served as a co-PI on several summer institutes in physics and physical science funded by the Eisenhower Professional Development Program and the Teacher Quality Improvement, in collaboration with Drs. Chandrasekhar, Keller, and McClure. Volkmann has collaborated with teachers and scientists on numerous professional development projects at the middle and secondary level. His science teaching ideas have appeared in *Science and Children*, *The Science Teacher*, and *School Science and Mathematics*. His research, focused on identity and inquiry, has been published in *Science Education* and the *Journal of Research in Science Teaching*.

Project role: Dr. Volkmann will provide expertise in the areas of instructional strategies, formative assessment, and inquiry. He will consult with the curriculum committee as they design instruction for the summer academies. He will provide academy workshops that help participants make explicit connections between assessments, decision-making, and instructional strategies. Finally, he will assist in the planning and implementation of the Lesson Study graduate course designed specifically for participants in this project.

Dr. James Tarr, Assistant Professor of Mathematics Education, will serve as the mathematics education expert. A former middle and high school mathematics teacher, Dr. Tarr has earned the High-Flyer Award for Teaching Excellence in the College of Education for four consecutive years. Additionally, Dr. Tarr has served as a co-PI on several multi-year, multi-million dollar grants addressing the professional development of K-12 teachers, including the *Show-Me Middle School Mathematics Curriculum Center*, and *Connecting Middle School and College Mathematics*. He has conducted professional development activities for the *Missouri Center for Mathematics and Science Teacher Education*, was formerly Team Leader for the *Eisenhower Math/Science Regional Consortium*, *Appalachia Educational Laboratory, Inc.*, and is an author of curricular materials for middle school mathematics. His research interests include the use of students' mathematical reasoning in instruction, and the impact of curricular materials on student achievement and the classroom learning environment. His most recent project, *A Longitudinal Study of the Impact of High School Mathematics Textbooks of Two Types of Student Learning*, a collaboration between the College of Education and College of Arts & Sciences was funded by the National Science Foundation.

Project Role: Dr. Tarr will provide expertise in the professional development of teachers participating in summer institutes, particularly with respect to underlying mathematical concepts and skills associated with the teaching of physics. He will also serve in an advisory capacity in the planning and development of the summer institutes.



The Graduate School

University of Missouri-Columbia

210 Jesse Hall
Columbia, MO 65211-1160

PHONE (573) 882-6311
FAX (573) 884-5454

September 30, 2005

Ms. Sara Torres
Science Coordinator
Columbia Public Schools
555 Vandiver Drive
Columbia MO 65202

Dear Ms. Torres:

This letter is to express the strong support of the University of Missouri-Columbia for the *A-Time for Physics First* Math-Science Partnerships proposal that Ms. Torres of Columbia Public Schools and Prof. Chandrasekhar and her colleagues Profs. Volkmann and Tarr from MU are submitting to the Missouri Department of Elementary and Secondary Education. This proposal to the Math Science Partnerships program offers an exciting opportunity to broaden university participation and provide direct training to teachers in physics using a research-based educational strategy. Often regarded as a gateway course, early exposure to physics will undoubtedly enhance the talented pool of undergraduates who enter our science and engineering programs. MU is committed to sharing the expertise of these excellent faculty and the University's resources with the K-12 community. Building community with K-12 teachers will expose our faculty to more of the current teaching methods they use. The teaching provided by these highly-qualified teachers directly impact the quality of students we see at MU.

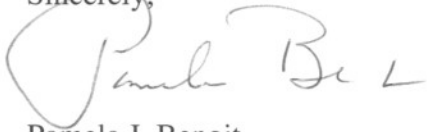
Prof. Chandrasekhar from the Physics Department and her colleagues Profs. Volkmann and Tarr from the College of Education have developed strong connections with Missouri school districts through their well-regarded teacher professional development programs. I cannot think of a stronger team to develop Physics programs in the state.

For our part, MU is committed to institutional change. We particularly support faculty as they work to improve their teaching. For example, MU offers direct recognition for excellent teaching in the form of eight separate awards. We recognize the value of improving the connections between K-12 teaching and science faculty. A tangible example of this is our recent support for enhancing science education at MU. Four new positions were created through Mission Enhancement where faculty are jointly appointed in science departments (Biology, Biochemistry or Physics) and in the College of Education. These new faculty will play a critical role in infusing research-based pedagogy into science departments.

As evidence of our commitment to this proposal, MU will waive tuition costs for three graduate credits in physics and one credit in science education every year for the 60 science teachers who will take part in this program.

The *A-Time for Physics First* project represents the most sustainable form of institutional change. MU is proud to be a partner in this effort. I give my strongest support to the project.

Sincerely,

A handwritten signature in cursive script, appearing to read "Pamela Benoit". The signature is written in dark ink and is positioned to the right of the word "Sincerely,".

Pamela J. Benoit
Interim Dean of the Graduate School

APPENDIX A – PARTNER IDENTIFICATION FORM

Copy this form for each partner that is participating in this proposal.

PARTNERSHIP INSTITUTION**Missouri State University****NAME AND TITLE OF PRIMARY CONTACT****Kandiah Manivannan, Associate Professor of Physics****ADDRESS (STREET ADDRESS, CITY, STATE & ZIP-CODE)****Dept. of Physics, Astronomy, and Materials Science****901 S. National Avenue****Missouri State University****Springfield, MO 65897****TELEPHONE NUMBER****417-836-6425****FAX NUMBER****417-836-6226****E-MAIL ADDRESS****ManiManivannan@MissouriState.edu****TYPE OF INSTITUTION/ORGANIZATION****Regional State University****DESCRIBE THE PARTNER'S MAIN ROLE IN THIS PROPOSAL**

Dr. Kandiah Manivannan, Associate Professor of Physics, Missouri State University (MSU), Springfield, is one of the members of the Leadership Team working with the PI and Co-PI. The leadership team will meet regularly in order to direct the work of the other groups. The Advisory Board will provide guidance to the Leadership Team, and the Leadership Team will establish the agenda for the work of the Curriculum Committee. Dr. Manivannan will be one of the higher education faculty members of the Curriculum Committee. This committee will design the academy curriculum and activities. The design will determine (a) depth of content and appropriate methodology, (b) alignment with Grade Level Expectations (GLEs), (c) equipment, materials and technology suitable for activities, (d) equipment needed in teacher kits and classroom sets for the kit lending program, (e) criteria for participant acceptance if the academy is oversubscribed, and (f) frequency of future meetings beyond summer 2006.

Dr. Manivannan will be the physics content expert and the physics modeling expert. He will train and advice the team on adapting modeling physics techniques to the *Physics First* (PF) curriculum. He will be lead instructor of the second section of the summer academy, and will lead follow-up sessions at Springfield for those participants who find that location more geographically accessible. He has many years of experience in modeling physics techniques pioneered at the Arizona State University. He has used physics modeling approach to conduct several professional development workshops for middle-school and high-school teachers in physics and chemistry. At Missouri State University (formerly known as Southwest Missouri State University) he has organized and ran modeling workshops for three separate summers with funding awarded by the Coordinating Board for Higher Education (CBHE) Eisenhower and Missouri Department of Higher Education (MDHE) Teacher Quality grants. Dr. Manivannan will oversee MSU salaries and travel.

Dr. James L. Puckett, Director of Missouri Virtual School (MVS) at the Center for Scientific Research and Education at Missouri State University, will have a significant involvement in the project as one of the consultants. He will provide assistance and oversee activities related to distance-learning technology during follow-ups and professional learning team meetings. These activities include, but not limited to, providing access to MSU's Breeze accounts after school hours and weekends so that Board members, partners, moderators, and participants can "meet" from their respective locations, saving travel expenses and time. MVS can also provide a meeting site (real and/or virtual) for classes, follow-up sessions, for participants in the southwest part of the state. Furthermore, MVS can help disseminate information to its schools. Ms. Becky Baker and/or Dr. David Moffatt at MSU are potential instructors and/or mentors for the distance-learning technology-related aspects of this project.



Missouri State
U N I V E R S I T Y

October 3, 2005

Ms. Sara Torres
Columbia Public Schools
Science Department
555 Vandiver Drive
Columbia Mo 65202

Dear Ms. Torres:

Missouri State University is pleased to submit the enclosed Partner Identification Form for the University to participate in the project entitled *A Time for "Physics First" Academy* that is being submitted to the Missouri Department of Elementary and Secondary Education. Also enclosed is a letter of support from Dr. Lawrence Banks, Dean of the College of Natural and Applied Sciences, and a Partner Funding Request.

Dr. Kandiah Manivannan, Associate Professor of Physics, will be the lead person for our institution. Please contact Dr. Manivannan at (417) 836-6425 if you would like additional information. You can also contact Dr. William Alter III, Director of the Office of Sponsored Research and Programs, at (417) 836-5972 if additional information is needed on the University's commitment to the project. if can be of further assistance.

Sincerely,

James P. Baker
Vice President for Research
And Economic Development

mczr

Enclosures

cc: Kandiah Manivannan

OFFICE OF SPONSORED RESEARCH AND PROGRAMS

901 South National Avenue • Springfield, Missouri 65897 • 417-836-5972 • Fax 417-836-8818

www.missouristate.edu

An Equal Opportunity/Affirmative Action Institution



Missouri State[™]

U N I V E R S I T Y

October 3, 2005

Federal Discretionary Grants
Department of Elementary and Secondary Education
205 Jefferson Street, P.O. Box 480
Jefferson City, MO 65102-0480

To Whom It May Concern:

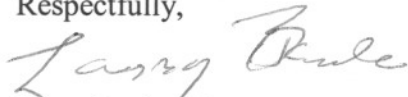
As Dean of the College of Natural and Applied Sciences at Missouri State University, please know that I support the project entitled **A Time for "Physics First" Academy** that is being proposed by the submission of this proposal. I believe this project will improve the teaching of physics, and the sciences that would then be taught later, in our state by those K-12 teachers and schools who participate.

Missouri State is one of the larger producers of science teachers in Missouri. This fact means that the faculty of this university need to have programs of high quality, and that they need to be able to respond to the individual needs of prospective and practicing science teachers. Our faculty have indeed worked closely with prospective and practicing science teachers for many years. Programs like this one can help make those ties even stronger for the person we have involved, Dr. Mani Manivannan, in this proposal. His extensive work with master teachers has enabled him to continue to extend and enhance Missouri State's pre-service and in-service programs, and provide more comprehensive and on-going professional development through a very successful previous grant entitled "**Physics Modeling Workshops.**"

Joint projects with other universities, such as the one proposed here, are also catalysts for university programmatic growth as faculty members share ideas with themselves and K-12 faculty. These activities can only serve to strengthen ties between the cooperating universities.

Within the constraints of its budget, the College of Natural and Applied Sciences at Missouri State is committed to providing the resources needed for the successful operation of this proposed project. For example, the Missouri Virtual School, sponsored by Missouri State, can be made available, as requested and when possible, to provide distance learning opportunities associated with these proposed activities.

Respectfully,


Larry Banks, Dean

COLLEGE OF NATURAL & APPLIED SCIENCES

901 South National Avenue • Springfield, Missouri 65897 • 417-836-5249 • TDD 1-800-735-2966 • Fax 417-836-6934

www.missouristate.edu

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APPENDIX A – PARTNER IDENTIFICATION FORM

Copy this form for each partner that is participating in this proposal.

PARTNERSHIP INSTITUTION

Heart of Missouri Regional Professional Development Center at the University of Missouri-Columbia

NAME AND TITLE OF PRIMARY CONTACT

Dr. Paul L. Pitchford, Director

ADDRESS (STREET ADDRESS, CITY, STATE & ZIP-CODE)

205 London Hall

TELEPHONE NUMBER

573.882.0859

FAX NUMBER

573.884.5622

E-MAIL ADDRESS

pitchfordp@missouri.edu

TYPE OF INSTITUTION/ORGANIZATION

Service center at a major university

DESCRIBE THE PARTNER'S MAIN ROLE IN THIS PROPOSAL

The Heart of Missouri Regional Professional Development Center (RPDC) commits to serve as the primary dissemination structure for this process and will provide consultation services as the professional development system for this grant is created and implemented. As a member of the Missouri Regional Professional Development Center network, the RPDC provides professional development opportunities for Missouri teachers, principals, superintendents, and other educators. Over the previous 10 years these services include the dissemination of current effective professional development workshops and seminars as well as long-term initiatives for Missouri educators. These experiences will serve as the experiential foundation for our work with this grant. The RPDC will share its work with grant with the other members of the RPDC system.

The professional development activities may include some or all of the following characteristics. Professional development activities that:

- (1) Are based on scientifically based research and state academic content standards, student academic achievement standards, and assessment;
- (2) Improve and increase teachers' knowledge of the academic subjects they teach;
- (3) Enable teachers to become highly qualified;
- (4) Are sustained, intensive, and classroom-focused in order to have a positive and lasting impact on classroom instruction and the teacher's performance in the classroom; and
- (5) Include in-class mentoring and coaching.



Working to Meet Professional Development Needs of Missouri Educators

<http://www.coe.missouri.edu/~rpdc> • email: pitchfordp@missouri.edu

205 London Hall

College of Education

University of Missouri

Columbia, MO 65211

Phone: 800-214-2753

or (573) 882-0859

Fax: (573) 884-5622

2 October 2005

To the Grant Administrator:

The Heart of Missouri Regional Professional Development Center (RPDC) commits to serve as the primary dissemination structure for Mathematics and Science Partnership Program's Missouri High School Science Reform Initiative and will provide consultation services as the professional development system for this grant is created and implemented.

As a member of the Missouri Regional Professional Development Center network, the RPDC provides professional development opportunities for Missouri teachers, principals, superintendents, and other educators. Over the previous 10 years these services include the dissemination of current effective professional development workshops and seminars as well as long-term initiatives for Missouri educators. These experiences will serve as the experiential foundation for our work with this grant. The RPDC will share its work with the grant partners with the other members of the RPDC system and assist them in implementing appropriate portions of this program in their regions.

The professional development activities may include some or all of the following characteristics. Professional development activities that:

- Are based on scientifically based research and state academic content standards, student academic achievement standards, and assessment;
- Improve and increase teachers' knowledge of the academic subjects they teach;
- Enable teachers to become highly qualified;
- Are sustained, intensive, and classroom-focused in order to have a positive and lasting impact on classroom instruction and the teacher's performance in the classroom; and
- Include in-class mentoring and coaching.

The Heart of Missouri RPDC is very pleased to support this excellent grant proposal, and we look forward to beginning this work in the near future.

Sincerely,

A handwritten signature in black ink, appearing to read "Paul L. Pitchford".

Paul L. Pitchford, Ph.D.
Director

APPENDIX A – PARTNER IDENTIFICATION FORM

Copy this form for each partner that is participating in this proposal.

PARTNERSHIP INSTITUTION

Ozark Rural Systemic Initiative and Southwest Center for Educational Excellence

NAME AND TITLE OF PRIMARY CONTACT

Janna A Gordanier, Project Director

ADDRESS (STREET ADDRESS, CITY, STATE & ZIP-CODE)

528 South Ellis, Webb City, MO 64870

TELEPHONE NUMBER

417-673-7078

FAX NUMBER

417-673-7799

E-MAIL ADDRESS

jgordanier@ozarkrsi.org

TYPE OF INSTITUTION/ORGANIZATION

Regional Educational Support Center

DESCRIBE THE PARTNER'S MAIN ROLE IN THIS PROPOSAL

The Ozark Rural Systemic Initiative and Southwest Center for Educational Excellence will assist the A-TIME for Physics First project in recruiting teachers from their consortium of over fifty school districts. They will help host team meetings, study group sessions and local curriculum alignment workshops at their facility. They will help with follow-up sessions. They have already helped recruit three school districts to participate in this proposal (Carthage, Seneca and Webb City), and they will be invaluable in helping connect with the Southwest part of the state.

The project director of the math/science at this Educational Support Center, Janna Gordanier, will also be willing to serve on the Advisory Board of the project.



528 South Ellis Street, Webb City, MO 64870
Phone: 417-673-7078 Fax: 417-673-7799

Dear Sara Torres,

As project director of the Ozark Rural Systemic Initiative Math/Science Reform Project of Southwest Missouri, I would like to express our desire to be one of the partners to bring "Physics first" to teachers of this region. Our past work with Dr. Meera Chandrasekhar with physics units for elementary teachers demonstrated to us that this project will also be an inquiry-based, content specific project delivered in a high-quality manner consistent with the national standards of professional development.

As a partner, our staff will help recruit teachers from the fifty school districts that belong to the Southwest Center for Educational Excellence Consortium, host the Professional Learning Teams as they implement the lesson study, and work with the Coach-Mentor.

I will serve on the advisory board for "A Time for Physics First" and consult with the partnership personnel as we work together to bring quality science instruction to our students.

Sincerely,

Janna Gordanier, Project Director
Ozark Rural Systemic Initiative

APPENDIX A - PARTNER IDENTIFICATION FORM

Copy this form for each partner that is participating in this proposal.

PARTNERSHIP INSTITUTION

Cooperating School Districts and the St. Louis Regional Professional

NAME AND TITLE OF PRIMARY CONTACT

Development Center

John Oldani, Executive Director

ADDRESS (STREET ADDRESS, CITY, STATE & ZIP-CODE)

1460 Craig Road St. Louis MO 63146

TELEPHONE NUMBER

314-692-1210

FAX NUMBER

314-872-2953

E-MAIL ADDRESS

joldani@csd.org

TYPE OF INSTITUTION/ORGANIZATION

Education Service Agency

DESCRIBE THE PARTNER'S MAIN ROLE IN THIS PROPOSAL

Cooperating School Districts and the St. Louis Area Regional Professional Development Center have excellent contacts and will serve as conduits for utilizing exceptional participants as future professional development consultants for Missouri districts interested in Physics First. This partnership will help the sustainability of this project. In addition, Cooperating School Districts and the St. Louis Area Regional Professional Development Center will serve as consultants as the project creates the Physics First professional development package for the Missouri Department of Elementary & Secondary Education.



Cooperating School Districts

1460 Craig Road
St. Louis, MO 63146
800-835-8282 • 314-872-8282 • 314-872-9128 fax
www.csd.org

October 5, 2006

Meera Chandrasekhar
Professor of Physics and Astronomy
University of Missouri-Columbia
416 Physics Building
Columbia MO 65211

Dear Dr. Chandrasekhar:

It is with pleasure that I write this letter of support for the proposal to develop a professional development program entitled "Physics First," which will target secondary physics teachers, especially those teaching ninth grade. Cooperating School Districts and the St. Louis Regional Professional Development Center serve the St. Louis area school districts that are participating in the pilot project, and it would be a natural fit for CSD and the St. Louis Area RPDC to partner in this exciting project.

Cooperating School Districts is a voluntary, membership-driven organization owned and governed by 30 public school districts in the St. Louis metropolitan area. CSD serves an additional 31 public school districts that are also members of the organization. Cooperating School Districts is a non-profit educational service agency that provides professional development, communication, financial, personnel, legislative and advocacy services to its member school districts.

Cooperating School Districts operates the St. Louis Area RPDC, and professional development and training is the primary function of the RPDC. One of the stated long-term goals of Physics First, which is to increase proficiency of students in science on the Missouri Assessment Program (MAP), is an excellent fit with the work of the RPDC. The St. Louis Area RPDC provides support and technical assistance to districts with the Missouri School Improvement Program (MSIP), and MAP is a key component of MSIP. The three-phase program as described in the Physics First proposal will provide excellent support to teachers through curriculum committees, development and implementation of a research-based Physics First professional development curriculum, content academies, in-class coaching, mentoring, professional learning teams, follow-up meetings and conferences. All support mechanisms appear to be in place to provide for a highly successful program.

It is with pleasure that Cooperating School Districts and I, personally, enthusiastically support this partnership. The proposed project will improve teacher expertise and pedagogy in the area of physics and mathematics and ultimately increase students' interest and success in science and engineering degree programs. This is a win-win project for teachers and students!

Sincerely,

A handwritten signature in black ink, appearing to read 'John Oldani', is written over a horizontal line.

John Oldani
Executive Director

JO:er

APPENDIX A – PARTNER IDENTIFICATION FORM

Copy this form for each partner that is participating in this proposal.

PARTNERSHIP INSTITUTION**Columbia Water and Light Department, City of Columbia, MO****NAME AND TITLE OF PRIMARY CONTACT****Jay Hasheider, Energy Services Supervisor****ADDRESS (STREET ADDRESS, CITY, STATE & ZIP-CODE)****PO Box 6015****TELEPHONE NUMBER****573-874-7685****FAX NUMBER****573-443-6875****E-MAIL ADDRESS****rjh@gocolumbiamo.com****TYPE OF INSTITUTION/ORGANIZATION****Municipal Electric Utility****DESCRIBE THE PARTNER'S MAIN ROLE IN THIS PROPOSAL**

The Water and Light Department has been actively involved for the past ten years in teaching energy efficiency in the Columbia Public Schools. The Department has developed it's own program, called 'Energy Challenge', that involves utility personnel giving in-class presentations, coupled with a computerized energy audits, that have become a standard part of the 9th grade science curriculum. Annually over 1,000 students are involved in this program.

Additionally, the Department has developed an 'Energy Challenge Plus' package that teaches 9th grade technology students the physical principles involved in Air Conditioning. This is a one class period program that explains the basis of the Latent Heat of Vaporization and how it is used to provide the cooling in an air conditioning system.

Another program that the Department has been fundamentally involved with is 'Saturday Science'. This program is geared at 8th & 9th grade students who have an inclination to learn about real world applications of science. The Department has developed four programs that attempt to make a connection to the real world through thermal and electrical applications. Heat Transfer has students measuring heat flows through the three heat transfer pathways; Renewable Energy gets students to build devices that capture heat through solar, wind and biomass, and compare the amount needed to heat enough hot water for their morning shower; Transformers has the students learning how voltages can be manipulated and building their own transformer to run a tiny radio; Electric City has students learn electric wiring techniques by building a village of houses with appliance loads, which are then powered by a bike, pedaled by students who quickly learn why having all the appliances on at the same time is hard on the power plant.

The Water and Light Department is able and willing to participate in the Physics First program as it is involved in teaching the above concepts (Thermal, Electrical, Energy Efficiency). We can provide staff to assist in curriculum development and to directly teach specific components of the trainings that are to occur in 2007 & 08.

We would envision our role as one that helps make the connection between the academic principles taught in physics and their real world applications.



CITY OF COLUMBIA, MISSOURI

September 28, 2005

WATER AND LIGHT DEPARTMENT
COLUMBIA TERMINAL RAILROAD

Sarah Torres, Science Coordinator
Columbia Public Schools
555 Vandiver Dr.
Columbia, Mo. 65202

Dear Ms. Torres:

Thank you for your interest and confidence in Water and Light as a potential partner in the Physics First program. Education is an important mission for our organization and we are always interested to work with Columbia Public Schools.

My understanding of your new project is that it will involve a complete curriculum change for 9th grade students who will be studying a full year of physics instead of 1/2 year, and that there is to be an attempt to make the connection between 'academic' physics and the 'real' world.

My staff has been working on such concepts in the Energy Challenge for years. We would like to be involved in any way we can in your project, including participating in training science teachers during the summer in Columbia.

Please review the descriptions of our programs in the enclosed Partner Identification Form to see what we can provide in the way of instructional concepts.

It would be our pleasure to participate in the Physics First program. Good luck in your efforts.

Sincerely,

Daniel M. Dasho, Director
Columbia Water and Light

DMD/pem

APPENDIX A – PARTNER IDENTIFICATION FORM

Copy this form for each partner that is participating in this proposal.

PARTNERSHIP INSTITUTION

Central Missouri Astronomical Association

NAME AND TITLE OF PRIMARY CONTACT

Ralph Dumas, Chairman, Board of Directors

ADDRESS (STREET ADDRESS, CITY, STATE & ZIP-CODE)

14 Rockingham Dr. Columbia, Mo. 65203

TELEPHONE NUMBER

573-446-2024

FAX NUMBER

N/A

E-MAIL ADDRESS

uraniborg@mchsi.com

TYPE OF INSTITUTION/ORGANIZATION

Non-profit service organization (Astronomy outreach club)

DESCRIBE THE PARTNER'S MAIN ROLE IN THIS PROPOSAL

Our organization would assist the teachers involved with this program in learning the online data bases available from NASA and other observatories world wide in the "Laws Virtual Observatory" computer lab. We would present PowerPoint presentations on amateur and beginning astronomy (the same ones used when we visit schools). We would also host a "star party" with telescope viewing at Laws Observatory for the participants.

Central Missouri Astronomical Association



September 26, 2005

Sara Torres
Science Coordinator
Columbia Public Schools

Dear Ms. Torres,

Our organization would like to express our support for the High School Reform Math Science partnership with the University of Missouri Physics Department. Using the "Laws Virtual Observatory" computer lab, we would demonstrate the resources available online from NASA and observatories around the world for teaching and research. We have PowerPoint presentations on amateur and beginning astronomy that we show at schools and public events during the year that I am sure the teachers involved would find useful. We would also set up evenings for telescope viewing using the instruments at Laws Observatory for the participants.

The Central Missouri Astronomical Association was formed by University of Missouri-Columbia astronomer and Laws Observatory director E.S. Haynes in 1949 with the goal of promoting public outreach for central Missouri observatories (Laws at UMC and Morrison at Central Methodist College). We have helped maintain Laws observatory and keep it open to the public for over fifty-five years! Our club hosts over one hundred public events per year, fifty of those at Laws Observatory alone.

Sincerely,

Ralph Dumas
Chairman of the Board,
Central Missouri
Astronomical Association

APPENDIX A – PARTNER IDENTIFICATION FORM

Copy this form for each partner that is participating in this proposal.

PARTNERSHIP INSTITUTION

M.A. Henry Consulting, LLC

NAME AND TITLE OF PRIMARY CONTACT

Martha A. Henry

ADDRESS (STREET ADDRESS, CITY, STATE & ZIP-CODE)

5715 Milentz Ave, St. Louis, MO 63109

TELEPHONE NUMBER

314-353-8905

FAX NUMBER

314-353-8208

E-MAIL ADDRESS

m.a.henry-consulting@sbcglobal.net

TYPE OF INSTITUTION/ORGANIZATION

Research and Evaluation

DESCRIBE THE PARTNER'S MAIN ROLE IN THIS PROPOSAL

Dr. Martha A. Henry will serve as lead evaluator. She has been an evaluator for eight years. She brings experience as a middle and high school teacher, university professor, curriculum developer, a Senior Consultant at McREL and an evaluator for projects funded through the Missouri Department of Higher Education, the National Science Foundation, the U.S. Department of Education, and several foundations for projects from Washington University in St. Louis and the University of Missouri Columbia. Her background includes experience leading school districts in alignment of curriculum and assessment to standards, professional development, and teacher development. Research and evaluation projects have focused on the recruitment and retention of teachers, teacher development, the interaction of school systems with reform efforts, the impact of professional development activities on change in teacher's content knowledge and implementation of inquiry, and the effects of that change on student achievement.

Project role: Dr. Henry, President of M.A. Henry Consulting, LLC will be the lead evaluator. She will be responsible for interface with the Project Investigator, designing and validating instruments, data collection, analysis, and reporting.

Keith S. Murray will serve as senior project evaluator. His evaluation experience extends 15 years, starting with public health and medical service fields. In recent years he has acquired experience with evaluation projects in social service and formal and informal education areas, focusing on teacher development and retention and formal-informal education collaboratives. Mr. Murray has directed statewide data collection and analysis systems for the state of Colorado, including serving as founder of the state's Behavioral Risk Factor Surveillance System, a CDC-funded survey unit. He has consulted in information management and dissemination for state and local government, including projects in Iowa, Colorado, South Dakota, Maryland, and Maine. He also has managed medical research projects for Washington University in St. Louis, including experience in instrumentation and analysis design.

Project role: Mr. Murray will be an evaluator on the project. He will interface with the Project Director, lead the evaluation instrument design; train observers, and take part in data collection, management and analysis, reporting and dissemination.

Ms. Sara Torres
Science and Health Coordinator
Columbia Public School District
Columbia, MO 65211

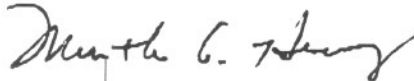
Dear Sara:

Thank you very much for the opportunity offered M.A. Henry Consulting, LLC to collaborate with you to provide evaluation services on the Academy for Teachers – Inquiry and Modeling Experiences for Physics First (A-TIME for Physics First) project. This project, as a Math-Science Partnership, is designed to respond to the needs expressed for professional development among ninth grade physics teachers as developed by a diverse group of informed partners, and iterations of assessment and refinement to field a rigorous and responsive programmatic content

The experience and success we at M.A. Henry Consulting, LLC have had in evaluating complex, collaborative projects such as yours reflects our professional interest in efforts to improve student achievement through sustained, nurturing support of math and science teachers. The evaluation model we apply includes formative and summative methods, providing close and continued reflection and feedback as the the project leaders require.

On behalf of Keith Murray and myself, as the senior members of the evaluation team, we commit M.A. Henry Consulting, LLC to the project and greatly look forward to the impact we expect from it. Please contact either Mr. Murray or myself should have any questions or needs for the project.

Sincerely,



Martha A. Henry, Ed.D.
President

Sec. IX. BUDGET NARRATIVE

The letters referenced in this section (A, B, etc) refer to lines in the Total Budget page.

6100: Salaries:

Table IX. Time commitment of personnel (months), including breakout on categories of activities				Time spent each year on:	
				Admin Work	Lesson Preparation, Committees, Teaching
Name	2005-06	2006-07	2007-08		
Sara Torres, Director, CPS	2.0 mos	2.0	2.0	1.0 mos	1.0 mos
Meera Chandrasekhar, faculty, MU	2.0	2.0	2.0	0.5	1.5
Mark Volkmann, faculty, MU	1.0	1.0	1.0	-	1.0
James Tarr, faculty, MU	0.5	0.5	0.5	-	0.5
Kandiah Manivannan, faculty, MSU	2.0	2.0	2.0	0.3	1.7
Sarah Hill, admin/ lab manager, MU	6.0	6.0	6.0	6.0	-
Fiscal Admin Assistant, CPS	1.5	1.5	1.5	1.5	-

A. and B. Salaries for the director, faculty, and administrative assistants at MU and at CPS are based on their regular salaries and their time commitment each year, as shown in columns 2, 3 and 4 of Table IX. The time spent on specific activities each year is shown in columns 5 and 6. A 3% salary increase is built in for all personnel for Years 2-3. MU clerical staff will be paid \$1500 annually to assist participants with registration, records, processing vouchers, etc, -- duties that cannot be performed by the academy's administrative staff. (Individual partner budgets)

C. Two peer teachers will work 5 weeks in the summer and be paid **\$4000** each. 5 coach-mentors will be paid stipends on the basis of \$160/day to conduct: (a) 8 visits/ teacher, 12 teachers / mentor, 480 visits total. They will spend 3 hr visiting + 3 hr recording, discussion and paperwork so that each visit counts as 0.75 day. (b) Summer academy (15 days x 5 mentors) (c) Follow-up meetings (4 days x 5 mentors) (d) CC meetings (8 meetings x 3 mentors) (e) Advisory Board meetings (2 meetings x 1 mentor), and (f) Monthly meetings (8 meetings x 5 mentors). (b) – (f) count as full days. Year 1 budget includes summer, follow-up, Advisory Board, Curriculum Committee and September 2006 visits; Year 2 and 3 budgets go from Oct 1- Sep 30, and include 8 visits. Year 1 budget is **\$27,360**; Year 2 and 3 are **\$83,360**, included in MU's budget to facilitate hiring retired teachers as Clinical Associates.

Note: Since Year 1's budget ends on Sep 30, 2006, the mentors will have just completed one month's visits. Therefore the Oct-May visits in the 2006-07 academic year, associated with the Year 1 summer academy are budgeted in the Year 2 budget. Similarly the Year 2 summer academy mentor visits are budgeted in the Year 3 budget. As discussed in our meeting on Nov 21, 2005, the year 3 summer academy mentoring will have to be conducted after Sep 30, 2008, and is therefore included in a separate column as the Year 4 budget.

D. 3 undergraduates paid \$8/hr (Yr 1), will each work 1000 hours/year (40 hrs/week in summer, 12 hours/week during academic year) testing experiments, processing kits, setting up academy equipment; one of them will design and maintain the web site (**\$24,000**). Two graduate assistants (**\$3000 ea**) will be paid each summer (8 weeks) to assist with teaching (MU).

6200: Employee Benefits

E. and F. Fringe benefits for faculty, staff and students are calculated at their institutional rates: 31% faculty and staff, 7.65% for coach-mentors and peer teachers; \$1253 ea. for graduate assistants; 21% for MSU; 21.88% for CPS director, 31% for CPS staff (in partner budgets)

6300: Purchased Services: Budget planned on the basis of 60 science teachers - 40 in dorm, 10 commuters and 10 are local. Similar proportions used for math teachers and administrators.

G. Stipends for 60 science teachers to attend summer academies and follow-up days (19 days) are calculated at \$100/day in years 1 and 2 ($\$1900 \times 60 = \$114,500$), increasing to \$110/day in year 3; Stipends for 60 teachers for PLT meetings, 20 hours/year during the academic year (**\$20,000**); Stipends for 12 math teachers are for 5 days; for 12 administrators for 2 days ($\$500 \times 12 + \$200 \times 12 = \$8400$, years 1 and 2 only. Stipends for CC meetings (\$100/ day) include monthly meetings (3 teachers, 3 administrators for 8 days), writing team meetings (10 teachers, 16 meetings, 0.5 days) and advisory board meetings (2 teachers and 2 administrators, 2 days each): ($\$800 \times 6$ people) + ($\$800 \times 10$) + ($\200×4) = **13,600**. Total: **156,000** (yr.1,2); 161,000 yr 3.(CPS)

Note: Since Year 1's budget ends on Sep 30, 2006, the participants will have just completed the academy, but not the follow-up visits or the PLT meetings. Therefore the follow-ups and PLTs in the 2006-07 academic year, associated with the Year 1 summer academy are budgeted in the Year 2 budget. Similarly the Year 2 summer academy follow-ups and PLTs are budgeted in the Year 3 budget. As discussed in our meeting on Nov 21, 2005, the year 3 summer academy follow-ups and PLTs will have to be conducted after Sep 30, 2008, and are therefore included in a separate column as the Year 4 budget.

H. Dormitory lodging: \$38/day for 48 science teachers, and 5 coach-mentors, for 23 days (3 weeks+ 4 follow-up), 3 peer teachers + instructor (5 weeks); 8 math teachers for 5 days and 8 admin for 2 days. Total: **\$45,448**, year 1. 5% increases for years 2 and 3. (MU budget, rooms at MU dorm).

I. Meals, \$28 /day for dorm participants; \$ 9 lunch + \$1 parking daily for locals and commuters (20 participants x 23 days, 4 math teachers x 5 days and 4 administrators x 2 days; **\$38,368**. Advisory Board and Curriculum Committee lunches, **\$1152** (total **\$39,520**) (MU).

J. Mileage CPS budget (\$0.365/mile): Mileage for dorm residents is calculated at 250 miles each: 6 trips for 40 science teachers, 1 trip for 8 math teachers, and 1 trip for 8 administrators; and commuter mileage at 100 miles each: 19 trips for 10 science teachers, 5 trips for 2 math teachers, and 2 trips for 2 administrators = **\$30,806**.

CC and Advisory Board, 200 miles/trip. CC: 6 people x 8 trips + AB: 4 people, 2 trips = **\$4088**

MU budget (\$0.365/mile): Mileage by coach-mentors, 480 trips, 80 miles average + 6 trips to Summer academy and follow-up= **\$16,754**; Advisory Board travel for non-district members, 2 trips, 4 members, average 200 miles = **\$584**

MSU budget (\$0.375/mile): Dr. Manivannan's mileage, 12 trips, 400 miles @ = **\$ 1800**.

Total mileage budget in line J is **\$54,032**

K. Conference Travel CPS budget: 60 teachers will attend the 2006 STOM meeting (\$70 registration + \$50 shared room) = **\$7200** in Yr 1. In years 2 and 3 they will attend Interface. We assume that 10 participants will submit presentations and can attend free. For 50 participants, \$200 registration + \$100 shared rooms for 2 nights, **\$15,000** in years 2 and 3.

Field trip to planetarium (school bus) is budgeted at \$260 in year 1.

MU budget: Participant and staff to travel to national conferences is 6 trips in year 1 at \$1200 each (**\$7200**); 8 trips in years 2 and 3 (**\$9600** each).

Total travel budget in line K is **\$14,660** (Yr 1); **\$24,600** (Yrs 2 and 3)

L. Consultants from other districts and RPDC's: Mentor training is budgeted at \$2000 (5 meetings during summer and follow-ups); PLT-PD for participants and mentors during summer is budgeted at \$1200 (3 meetings); 2 consultants from schools such as Clayton high school where PF has been successfully implemented, and who have expressed interest in helping write the curriculum will be supported for 10 days at \$160 each, (**\$3200**); the attendance of one of

them at CC meetings is budgeted at \$480 (3 meetings); The Astronomy consultants will present four sessions and be paid \$800; **\$7,680**, Yr 1. In Yrs 2 and 3 the RPDC meetings will be decreased to one meeting each for coaching and PLTs; the Clayton consultant roles will remain at the same level **\$4,480** Yrs 2 and 3).

M. Symposia will be professionally recorded and made into DVDs and duplicated for all participants, **\$1750/year** (MU)

N. Transcript fee for two semesters annually, \$10/teacher/semester = $10 \times 60 \times 2 =$ **\$1200** (MU)

O. Distance learning access, \$50/ yr for 30 participants plus \$300 incidental, **\$1800**, (MSU)

P. Evaluator costs: for determining and contacting comparison schools; designing instruments; validation and analysis of pre/post student tests and teacher tests; observation, including meetings of CC, follow-ups, leadership team, coaches, and lesson study groups; document analysis (PD and curriculum) for alignment; video analysis; interactions and informal reports to PI's, focus group development and administration for coaches and data analysis; development and administration of surveys for materials support, and math and administrator follow-up; and annual reports with a final year 3 report. Salaries: Henry 43 days and Murray 48 days at \$600/day, statistician at \$400/day for 9 days; Admin. Asst salary at \$96/day (\$12/hr) for 15 days; 3% annual increases. (**\$59,640** in year 1). Fringe benefits at 31% only for senior staff (NSF formula) (**\$17,856** in year 1). Other: Communication costs (1/4 of \$100 monthly costs for telephone and DSL) (\$300 yr 1, 5% annual increase). Total costs **\$76,866** (year 1)

6400: Materials and Supplies:

Note: Although all equipment is for use in schools, funding is in the MU budget to facilitate ordering by instructors and lab manager, and to negotiate a good price by purchasing in bulk.

Q. Teacher kits: \$2,350 / teacher + 10 additional handhelds at \$350 in Yr 1 (to cover breakages over 3 years), \$1,300 in years 2 and \$1100 in year 3 (per teacher); for one set of equipment including, probeware, equipment from CPO etc, as determined by CC (**\$144,500** Yr 1, \$78,000 Yrs 2, and 66,000 in 3). Consumables: \$150 / participant (**\$9,000**). 25 sets of kits at plus demonstration equipment will be purchased for academy activities each year (**\$66,230** in year 1, decreasing thereafter). These kits will do double-duty during the academic year: they will be transported to teachers as requested in a lending-library scheme. Incentive funding for 20 comparison classes (for evaluation): $20 \times \$200 =$ **\$4000/** year; Incentive for test validation, \$1350 for 9 teachers, \$9000 for 120 teachers over 3 years, distributed over years 1 and 2 (**\$675 + \$ 4500** in yr1); Yr 1, curricular materials, including texts, software, and relevant PD books: **\$32,750** in year 1. Year 1 total costs: **\$217,675**.

R. Transportation of classroom-sized kits from MU to schools, **\$9375**, increases annually. (MU)

S. Brochures and mailing costs of print materials: **\$4000** in year 1, decreases thereafter (MU)

T. Copying costs for print materials, **\$8000** annually (MU).

APPENDIX B -- TOTAL BUDGET

BUDGET ITEMIZATION	YEAR 1	YEAR 2	YEAR 3	Year 4
6100: Salaries				
A. Project Director and Faculty	54,033	55,654	57,738	
B. Administrative assistants, clerical	19,500	20,040	20,596	
C. Peer teachers and coach-mentors	35,360	91,360	91,360	56,000
D. Undergrad and graduate assistants	30,000	30,900	31,827	
6100 Subtotal	138,893	197,954	201,521	56,000
6200: Employee Benefits				
E. Director at CPS; Faculty & staff at MU, MSU	19,914	20,498	21,217	
F. Coach-Mentors, teachers, staff at CPS	6,141	10,578	10,739	
6200 Subtotal	26,055	31,076	31,955	0
6300: Purchased Services				
G. Teacher Stipends, Academy, Curric Comm and Advisory Board	112,020	156,000	161,000	43,980
H. Lodging \$38 / day, summer and follow-up	45,448	47,720	50,106	
I. Meals, Summer, Follow-up, AdvisoryBd and Curr Comm	39,520	41,438	43,453	
J. Mileage, Participants, Mentors, Advisory Bd, Curr Comm	54,032	54,032	54,032	
K. Travel to facilities and conferences: staff and participants	14,660	24,600	24,600	
L. Consultants from other districts	7,680	4,480	4,480	
M. Recording and DVD production of science symposia	1,750	1,750	1,750	
N. Transcript fee, two semesters, \$10 /participant/semester	1,200	1,200	1,200	
O. Distance learning access costs	1,800	1,800	1,800	
P. Evaluator services	76866	78409	80379	
6300 Subtotal	354,976	411,429	422,800	43,980
6400: Materials/Supplies				
Q. Materials / Supplies, for teacher kits and lending library	261,655	139,175	119,000	
R. Checkout kit transportation	6000	9000	13500	
S. Brochures and Mailing	4,000	3,000	3,000	
T. Copying costs	8,000	8,000	8,000	
6400 Subtotal	279,655	159,175	143,500	0
6100-6400 SUBTOTAL	799,579	799,634	799,776	99,980
6500: Capital Outlay				
6500 Subtotal	0	0	0	
TOTAL	799,579	799,634	799,776	99,980

*Carry
Totals to
page 1
Total Budget.
CR

APPENDIX C – PARTNER FUNDING REQUEST				
On this form, list only the funds that this partner will be allocated. Copy this form for each partner that is receiving funds.				
PARTNERSHIP INSTITUTION : Columbia + other districts	Number of 60 participants:			
BUDGET ITEMIZATION	YEAR 1	YEAR 2	YEAR 3	Year 4
6100: Salaries				
Sara Torres, Project Director, 2 mos.	8,500	8,755	9,018	
Administrative assistant, 1.5 mos	3,000	3,090	3,183	
6100 Subtotal	11,500	11,845	12,200	
6200: Employee Benefits				
Fringe, Project director, 21.88%	1,860	1,916	1,973	
Fringe, admin assistant, 31%	930	958	987	
6200 Subtotal	2,790	2,873	2,960	
6300: Purchased Services				
Sci Teacher Stipends, \$100/day 19days, PLTs yr1,2; \$110 Yr 3	90,020	134,000	147,400	43,980
Math Teacher & admin Stipends, \$100/day yr1,2;	8,400	8,400		
Curric.Comm., Advisory Bd stipends (district personnel)	13,600	13,600	13,600	
Academy Mileage 19 trips commuters + 6 trips dorm	30,806	30,806	30,806	
Travel (bus) to planetarium	260			
Curric Comm, Advisory Bd mileage	4,088	4,088	4,088	
Participant travel to state conferences	7,200	15,000	15,000	
Consultants from other districts (modeling, etc)	7,680	4,480	4,480	
6300 Subtotal	162,054	210,374	215,374	43,980
6400: Materials/Supplies				
6400 Subtotal				
6100-6400 SUBTOTAL	176,344	225,092	230,534	
6500: Capital Outlay				
6500 Subtotal	0	0	0	
TOTAL	176,344	225,092	230,534	43,980

APPENDIX C – PARTNER FUNDING REQUEST

On this form, list only the funds that this partner will be allocated. Copy this form for each partner that is receiving funds.

PARTNERSHIP INSTITUTION : Missouri State University

BUDGET ITEMIZATION	YEAR 1	YEAR 2	YEAR 3
6100: Salaries			
Faculty	11,757	12,110	12,580
6100 Subtotal	11,757	12,110	12,580
6200: Employee Benefits			
21% of Salaries	2,469	2,543	2,642
6200 Subtotal	2,469	2,543	2,642
6300: Purchased Services			
Access to distance learning	1,800	1,800	1,800
Travel to MU, summer, curriculum committee	1,800	1,800	1,800
6300 Subtotal	3,600	3,600	3,600
6400: Materials/Supplies			
	0	0	0
6400 Subtotal	0	0	0
6100-6400 SUBTOTAL	17,826	18,253	18,822
6500: Capital Outlay			
	0	0	0
6500 Subtotal	0	0	0
TOTAL	17,826	18,253	18,822

APPENDIX C – PARTNER FUNDING REQUEST				
On this form, list only the funds that this partner will be allocated. Copy this form for each partner that is receiving funds.				
PARTNERSHIP INSTITUTION : University of Missouri - Columbia				
BUDGET ITEMIZATION	Year 1	Year 2	Year 3	Year 4
6100: Salaries				
Faculty Salaries	33,776	34,789	36,140	
Five Coach-mentors - all visits and committees	27,360	83,360	83,360	56000
Two Summer Peer teachers, 5 weeks	8,000	8,000	8,000	
AdminAsst / lab manager, 0.5 FTE	15,000	15,450	15,914	
Clerical support., 1 mo.	1,500	1,500	1,500	
3 UG lab & web design assistants, 0.5 FTE	24,000	24,720	25,462	
2 Graduate students, 0.5 FTE, summer	6,000	6,180	6,365	
6100 Subtotal	115,636	173,999	176,741	56,000
6200: Employee Benefits				
31% fringe for fac, staff	15,586	16,039	16,602	
7.65% for peer teachers and coach-mentors	2,705	6,989	6,989	
GRA fringe (5% increases built in)	2,506	2,631	2,763	
6200 Subtotal	20,797	25,660	26,354	
6300: Purchased Services				
Mentor Travel 480 trips (80mi ea) + academy, follow-up	16,754	16,754	16,754	
Advisory Board travel (2*4*200 miles)	584	584	584	
Lodging \$38/day in dorm, 48 Participants, mentors, peer teachers	45,448	47,720	50,106	
Meals -dorm@28/day+ lunch parking \$10 for commuters	38,368	40,286	42,301	
Advisory board, Curric Comm lunch	1,152	1,152	1,152	
Travel to national, regional conferences 1200 ea	7,200	9,600	9,600	
Transcript fee, two semesters, \$10 /participant/semester	1,200	1,200	1,200	
Recording and DVD production of symposia	1,750	1,750	1,750	
6300 Subtotal	112,456	119,046	123,447	
6400: Materials/Supplies				
Equipment kits	144,500	78,000	66,000	
Consumables, \$150 /participant	9,000	9,000	9,000	
Incentives for comparison schools, test validation	9,175	9,175	4,000	
Transportation for lending library classroom kits	6000	9000	13500	
Brochures and Mailing	4,000	3,000	3,000	
Copying costs	8,000	8,000	8,000	
Purchase of curricular materials	32,750			
Equipment for academy activities and lending library	66230	43000	40000	
6400 Subtotal	279,655	159,175	143,500	
6100-6400 SUBTOTAL	528,543	477,880	470,041	56,000
6500: Capital Outlay				
6500 Subtotal	0	0	0	
TOTAL	528,543	477,880	470,041	56,000

APPENDIX C – PARTNER FUNDING REQUEST

On this form, list only the funds that this partner will be allocated. Copy this form for each partner that is receiving funds.

PARTNERSHIP INSTITUTION : M.A. Henry Consulting -- Evaluator			
BUDGET ITEMIZATION	YEAR 1	YEAR 2	YEAR 3
6100: Salaries			
Martha A. Henry EdD	25,800	26,574	27,371
Keith S. Murray	28,800	29,664	30,554
Statistician	3,600	3,708	3,819
Admin	1,440	720	360
6100 Subtotal	59,640	60,666	62,104
6200: Employee Benefits	16,926	17,434	17,957
6200 Subtotal	16,926	17,434	17,957
6300: Purchased Services			
Communications costs	300	309	318
6300 Subtotal	300	309	318
6400: Materials/Supplies			
6400 Subtotal			
6100-6400 SUBTOTAL	76,866	78,409	80,379
6500: Capital Outlay			
6500 Subtotal	0	0	0
TOTAL	76,866	78,409	80,379

BUDGET NARRATIVE - ADDITIONAL PARTICIPANTS

The addition of 15 new science teacher participants from 3 districts (plus 2 coach mentors, 3 math teachers for 5 days and 3 administrators for 2 days) necessitates that we expand the number of sections from two to three for the summer academy. We will hire another faculty member, Dr. Dorina Kosztin¹ from MU's Physics Department to lead the class. An additional peer teacher, a 0.3 FTE undergraduate student, and two coach mentors who will mentor the 15 participants will also be hired. The administrative and teaching duties of the existing staff will also increase. We estimate that the administrative duties will increase by about 12.5% to 25%, depending on the nature of the person's duty. The teaching duties of existing faculty increase by 20 to 30%. An additional research assistant (an education graduate student) will be hired at 0.25FTE to assist with the PLT Lesson Study Course. This person will interact with all 75 participants. S/he will be hired starting from the 2006-07 academic year. The additional duties of the director/faculty/staff are listed in Table X. below.

Other costs, such as room and board, travel, kit costs scale with the number of participants. We assume that all of them will live in the dorm. Two districts will have teachers/administrators on the Curriculum Committee while one district will be represented on the Advisory Board.

Note: Since Year 1's budget ends on Sep 30, 2006, the participants and mentors will have just completed the academy, but not the mentor visits, Science Education course, follow-up visits or the PLT meetings. Therefore these expenses in the 2006-07 academic year, associated with the Year 1 summer academy are budgeted in the Year 2 budget. Similarly these Year 2 summer academy expenses are budgeted in the Year 3 budget. As discussed in our meeting on Nov 21, 2005, the year 3 expenses for these items will have to be conducted after Sep 30, 2008, and are therefore included in a separate column as the Year 4 budget.

The letters referenced in this section (A, B, etc) refer to lines in the Total Budget page.

6100: Salaries:

Table X. Time commitment of personnel (months), including breakout on categories of activities				Time spent each year on:	
Name	2005-06	2006-07	2007-08	Admin Work	Lesson Preparation, Committees, Teaching
Sara Torres, Director, CPS	0.25 mo	0.25	0.25	0.25 mo	-
Meera Chandrasekhar, faculty, MU	0.25	0.25	0.25	0.25	-
Mark Volkmann, faculty, MU	0.2	0.2	0.2	-	0.2
James Tarr, faculty, MU	0.15	0.15	0.15	-	0.15
Dorina Kosztin, faculty, MU	2.0	2.0	2.0	-	2.0
Sarah Hill, admin/ lab manager, MU	0.12	0.12	0.12	0.12	-
Fiscal Admin Assistant, CPS	0.375	0.375	0.375	0.375	-

A. and B. Salaries for the director, faculty, and administrative assistants at MU and at CPS are based on their regular salaries and their time commitment for the additional participants, as shown in columns 2, 3 and 4 of Table X. The time spent on specific activities each year is shown in columns 5 and 6. The additional commitment for Ms. Torres and Dr. Chandrasekhar are

¹ Dr. Kosztin is widely regarded as an excellent teacher at MU. She usually teaches freshman-sophomore level calculus-based physics. She received the Provost Junior faculty teaching award in 2005. She has also taught junior high school and high school previously

estimated to be 1/8 of that required for the 60 participants in the original grant. For Dr. Volkmann, it is estimated to increase by 20% (0.2 mo), since he will be conducting the Lesson Study class. Dr. Tarr will have to teach an additional section, estimated at 30% of the original amount (0.15 mo; same prep, additional presentations). Dr. Kosztin will be an additional faculty member hired to lead the third section, and her commitment will be 2 months (same as Drs Manivannan and Chandrasekhar, who are in similar roles). Ms. Hill's administrative duties are estimated to increase by 20% (0.1 mo), while that of the CPS fiscal assistant will increase by 25% (0.375 mo). A 3% salary increase is built in for all personnel for Years 2-3. (Individual partner budgets).

C. One peer teacher will work 5 weeks in the summer and be paid **\$4000**. 2 coach-mentors will be paid stipends on the basis of \$160/day to conduct: (a) 8 visits/ teacher, average of 7.5 teachers / mentor, 120 visits total. They will spend 3 hr visiting + 3 hr recording, discussion and paperwork so that each visit counts as 0.75 day. (b) Summer academy (15 days x 2 mentors) (c) Follow-up meetings (4 days x 2 mentors) (d) Monthly meetings (8 meetings x 5 mentors). (b) – (d) count as full days. Year 1 budget includes summer, follow-up and September 2006 visits; Year 2 and 3 budgets go from Oct 1- Sep 30, and include 8 visits. Year 1 budget is **\$8,200**; Year 2 and 3 are **\$23,040** included in MU's budget to facilitate hiring retired teachers as Clinical Associates.

D. 1 undergraduate paid \$8/hr (Yr 1), will work 600 hours/year (40 hrs/week in summer, 7 hours/week during academic year) testing experiments, processing kits, setting up academy equipment; (**\$4,800**). One Science Education graduate assistants (**\$7500**) will be paid during the academic year in years 2 and 3 to assist with the Lesson Study course (MU).

6200: Employee Benefits

E. and F. Fringe benefits for faculty, staff and students are calculated at their institutional rates: 31% faculty and staff, 7.65% for coach-mentors and peer teachers; \$1253 for graduate assistants; 21.88% for CPS director, 31% for CPS staff (in partner budgets)

6300: Purchased Services: *Budget planned on the basis of 75 science teachers - 55 in dorm, 10 commute and 10 are local. Similar proportions used for math teachers and administrators.*

G. Stipends for 15 science teachers to attend summer academies and follow-up days (19 days) are calculated at \$100/day in years 1 and 2, increasing to \$110/day in year 3; Stipends for 60 teachers for PLT meetings, 20 hours/year during the academic year (**\$33,500, year 1**); Stipends for 12 math teachers are for 5 days; for 12 administrators for 2 days ($(\$500 \times 12) + (\$200 \times 12) =$ **\$1900**, years 1 and 2 only. Stipends for CC meetings (\$100/ day) include monthly meetings (2 teachers/administrators for 8 days), and advisory board meetings (1 teacher or administrator, 2 days each): (**\$1800**). Total: **37,200** (yr.1,2); **38,650** yr 3.(CPS)

H. Dormitory lodging: \$38/day for 15 science teachers, and 2 coach-mentors, for 23 days (3 weeks+ 4 follow-up), 1 peer teachers (5 weeks); 3 math teachers for 5 days and 3 admin for 2 days. Total: **\$16,986**, year 1. 5% increases for years 2 and 3. (MU budget, rooms at MU dorm).

I. Meals, \$28 /day for dorm participants; Advisory Board and Curriculum Committee lunches, (total **\$13,188**) (MU).

J. Mileage CPS budget (\$0.365/mile): Mileage for dorm residents is calculated at 250 miles each: 6 trips for 15 science teachers, 1 trip for 3 math teachers, and 1 trip for 3 administrators; a = **\$8,760**.

CC and Advisory Board, 200 miles/trip. CC: 2 people x 8 trips + AB: 1 person, 2 trips = **\$1314**

MU budget (\$0.365/mile): Mileage by coach-mentors, 120 trips, 80 miles average + 6 trips to Summer academy and follow-up= **\$3,723**;

Total mileage budget in line J is **\$13,797**

K. Conference Travel CPS budget: 15 teachers will attend the 2006 STOM meeting (\$70

registration + \$50 shared room) = **\$1850** in Yr 1. In years 2 and 3 they will attend Interface. We assume that 10 participants will submit presentations and can attend free. For 13 participants, \$200 registration + \$100 shared rooms for 2 nights, **\$4000** in years 2 and 3.

L. Transcript fee for two semesters annually, \$10/teacher/semester = $10 \times 15 \times 2 =$ **\$300 (MU)**

M. Evaluator costs: for additional processing, interviews and data gathering and analysis.

Salaries: Henry 3 days and Murray 2 days at \$600/day, 3% annual increases. (**\$3000** in year 1).

Fringe benefits at 31% only for senior staff (NSF formula) (**\$930** in year 1).

6400: Materials and Supplies:

Note: Although all equipment is for use in schools, funding is in the MU budget to facilitate ordering by instructors and lab manager, and to negotiate a good price by purchasing in bulk.

N. Teacher kits: \$1,850 in year 1, \$1,300 in years 2 and \$1100 in year 3 (per teacher); for one set of equipment including, probeware, equipment from CPO etc, as determined by CC (**\$27,750** Yr 1, \$19,500 Yrs 2 and 16,500 in 3). Consumables: \$150 / participant (**\$2250**). Yr 1, curricular materials, including texts, software, and relevant PD books: **\$8188** in year 1. Year 1 total costs: **\$38,188**.

O. Transportation of classroom-sized kits from MU to schools, **\$1500**, increases annually. (MU)

P. Copying costs for print materials, **\$2000** annually (MU).

APPENDIX B -- TOTAL BUDGET

BUDGET ITEMIZATION	YEAR 1	YEAR 2	YEAR 3	
6100: Salaries				
A. Project Director and Faculty	16,253	16,740	17,381	
B. Administrative assistants, clerical	2,250	2,318	2,387	
C. Peer teachers and coach-mentors	12,200	27,040	27,040	14,840
D. Undergrad and graduate assistants	4,800	12,444	12,817	7,957
6100 Subtotal	35,503	58,542	59,625	22,797
6200: Employee Benefits				
E. Director at CPS; Faculty & staff at MU	5,406	5,569	5,778	
F. Coach-Mentors, teachers, staff at CPS	1,166	8,030	8,323	
6200 Subtotal	6,572	13,598	14,101	0
6300: Purchased Services				
G. Teacher Stipends, Academy, Curric Comm and Advisory Board	26,205	37,200	38,650	10,995
H. Lodging \$38 / day, summer and follow-up	16,986	17,835	18,727	
I. Meals, Summer, Follow-up, Advisory Bd and Curr Comm	13,188	13,847	14,540	
J. Mileage, Participants, Mentors, Advisory Bd, Curr Comm	13,797	13,797	13,797	
K. Travel to conferences: participants	1,850	4,000	4,000	
L. Transcript fee, two semesters, \$10 /participant/semester	300	300	300	
M. Evaluator services	3930	4048	4169	
6300 Subtotal	76,256	91,028	94,183	10,995
6400: Materials/Supplies				
N. Materials / Supplies, for teacher kits and lending library	45,688	21,750	18,750	
O. Checkout kit transportation	1500	2250	3375	
P. Copying costs	2,000	2,000	2,000	
6400 Subtotal	49,188	26,000	24,125	0
6100-6400 SUBTOTAL	167,518	189,167	192,034	33,792
6500: Capital Outlay				
6500 Subtotal	0	0	0	0
TOTAL	167,518	189,167	192,034	33,792

* Carry
to Total
Budget on
page 1
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APPENDIX C – PARTNER FUNDING REQUEST

On this form, list only the funds that this partner will be allocated. Copy this form for each partner that is receiving funds.

PARTNERSHIP INSTITUTION : Columbia + other districts	Number of participants: 15			
BUDGET ITEMIZATION	YEAR 1	YEAR 2	YEAR 3	Year 4
6100: Salaries				
Sara Torres, Project Director, .25 mos.	1,063	1,095	1,128	
Administrative assistant, .375 mos	750	773	796	
6100 Subtotal	1,813	1,867	1,923	
6200: Employee Benefits				
Fringe, Project director, 21.88%	233	240	247	
Fringe, admin asistant, 31%	233	239	247	
6200 Subtotal	465	479	493	
6300: Purchased Services				
Sci Teacher Stipends, \$100/day 19days, PLTs yr1,2; \$110 Yr 3	22,505	33,500	36,850	10,995
Math Teacher & admin Stipends, \$100/day yr1,2;	1,900	1,900		
Curric.Comm., Advisory Bd stipends (district personnel)	1,800	1,800	1,800	
Academy Mileage 6 trips dorm	8,760	8,760	8,760	
Curric Comm, Advisory Bd mileage	1,314	1,314	1,314	
Participant travel to state conferences	1,850	4,000	4,000	
6300 Subtotal	38,129	51,274	52,724	10,995
6400: Materials/Supplies				
6400 Subtotal				
6100-6400 SUBTOTAL	40,407	53,620	55,141	10,995
6500: Capital Outlay				
6500 Subtotal	0	0	0	
TOTAL	40,407	53,620	55,141	10,995

Note: Teacher stipends and travel to academy and conferences for all districts is included in the Lead School District budget

APPENDIX C – PARTNER FUNDING REQUEST

On this form, list only the funds that this partner will be allocated. Copy this form for each partner that is receiving funds.

PARTNERSHIP INSTITUTION : University of Missouri - Columbia

BUDGET ITEMIZATION	YEAR 1	YEAR 2	YEAR 3	YEAR 4
6100: Salaries				
Faculty Salaries	15,190	15,645	16,253	
Two Coach-mentors - all visits and committees	8,200	23,040	23,040	14840
One Summer Peer teacher, 5 weeks	4,000	4,000	4,000	
AdminAsst / lab manager, 0.1 FTE	1,500	1,545	1,591	
1 UG lab assistant, 0.3 FTE	4,800	4,944	5,092	
1 Graduate students, 0.25 FTE, acad year (Education)		7,500	7,725	7,957
6100 Subtotal	33,690	56,674	57,702	22,797
6200: Employee Benefits				
31% fringe for fac, staff	5,174	5,329	5,532	
7.65% for peer teachers and coach-mentors	933	2,069	2,069	
GRA fringe (5% increases built in)		5,722	6,008	
6200 Subtotal	6,107	13,119	13,608	
6300: Purchased Services				
Mentor Travel 90 trips (80mi ea) + academy, follow-up	3,723	3,723	3,723	
Lodging \$38/day in dorm, 18 Participants, mentors, peer teachers	16,986	17,835	18,727	
Meals -dorm participants @28/day	13,188	13,847	14,540	
Transcript fee, two semesters, \$10 /participant/semester	300	300	300	
6300 Subtotal	34,197	35,706	37,290	
6400: Materials/Supplies				
Equipment kits	35,250	19,500	16,500	
Consumables, \$150 /participant	2,250	2,250	2,250	
Transportation for lending library classroom kits	1500	2250	3375	
Copying costs	2,000	2,000	2,000	
Purchase of curricular materials	8,188			
6400 Subtotal	49,188	26,000	24,125	
6100-6400 SUBTOTAL	123,181	131,499	132,724	22,797
6500: Capital Outlay				
6500 Subtotal	0	0	0	
TOTAL	123,181	131,499	132,724	22,797

APPENDIX C – PARTNER FUNDING REQUEST

On this form, list only the funds that this partner will be allocated. Copy this form for each partner that is receiving funds.

PARTNERSHIP INSTITUTION : M.A. Henry Consulting -- Evaluator			
BUDGET ITEMIZATION	YEAR 1	YEAR 2	YEAR 3
6100: Salaries			
Martha A. Henry EdD	1,800	1,854	1,910
Keith S. Murray	1,200	1,236	1,273
6100 Subtotal	3,000	3,090	3,183
6200: Employee Benefits	930	958	987
6200 Subtotal	930	958	987
6300: Purchased Services			
6300 Subtotal	0	0	0
6400: Materials/Supplies			
6400 Subtotal			
6100-6400 SUBTOTAL	3,930	4,048	4,169
6500: Capital Outlay			
6500 Subtotal	0	0	0
TOTAL	3,930	4,048	4,169

Points to be negotiated before awarding grant

Realizing that the time period between the announcement of the Request for Grant Proposal and submission deadline was brief, the Department of Elementary and Secondary Education is requesting that these concerns be addressed and further details be provided for consideration before formally awarding funds to support grant activities. Please review the following concerns and provide a response to Craig Rector, Federal Discretionary Grants, by December 2, 2005.

Answers:

SECTION V – COMMITMENT AND CAPACITY OF PARTNERSHIP

- A major purpose of the Math-Science Partnership Grant project is to build a professional partnership among classroom teachers, district/building level administrators, institutions of higher education, state educational agencies, scientists/mathematicians/engineers working in business/industry, and others who impact student achievement. How will the governance structure (i.e., Leadership Team and Advisory Board) allow for and respond to frequent and regular input of all partners, especially teacher participants, to the decision-making and design process?

12 district members will represent all districts in the partnership: 2 district administrators and 2 teachers on the Advisory Board will have (meets twice a year) and 2 district administrators and 13 teachers (3 on committee, 10 writers) on the Curriculum Committee (CC), which meets monthly. At least one non-public will be included among the committees. The CC has a dual role – (1) designing academy activities and curriculum and (2) writing curriculum; 2 district administrators and 3 teachers in the first role and an additional 3 teachers in the second role. Other partners (RPDC, business, non-profit) will attend CC meetings 2-3 times a year when their content segments are being discussed. We consider it crucial to have input from all partners, AND to have a forum where they meet frequently and regularly. In addition, individual teachers who are not on the committees will have a direct line to the Leadership Team via web chat, email or telephone.

- How will institutionalization of the proposed reform be supported in and by the project partners (including university and school district personnel)? What commitment have partners made to the proposed reform (e.g., adoption of “Physics First” sequence, “Physics First” curriculum, and modeling methodology) that might ensure sustainability of program and attainment of goals?

Partner Districts have already committed to starting PF. Several have expressed great interest in examining the possible texts so that they can plan their ordering next year. We fully expect that after initial implementation they will continue teaching the course. Following attendance at the Academy, we expect that districts will implement the curriculum that they have learned at the academy, both in content and pedagogy. This will be monitored and reinforced via coach-visits, PLTs and follow-ups. A feature that will encourage this reform is the availability of classroom sets of equipment that can be checked out from the lending-library. Districts may also identify a part of their 1% PD budget to support PF.

The Leadership Team and University faculty will seek MO-DHE Teacher Quality Improvement grants, and grants from federal agencies to continue PF-PD. Our RPDC partners plan to tap teachers to provide PD to other Missouri districts. The PD packet produced by the project can be used statewide. Both university partners plan to use PD materials for preservice secondary teachers. The web site will also be maintained past the project.

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- What evidence can be provided that prior projects were successfully managed and sustained beyond the grant period by members of the Leadership team?

All members of the Leadership team have had several previous grants, many of which were renewed based on performance (page 5 of proposal). Drs. Volkmann and Chandrasekhar have been collaborators on several grants as well. Progress reports are available if necessary. Several of Dr. Chandrasekhar's programs have been sustained beyond the granting period: Exploring Physics extracurricular program for 5-8 grade (funded 1992-97); Families Exploring Science and Technology (grade 6-7) and Saturday Scientist (grade 8-9) (funded 1997-2002); Inservice institutes (funded 1993-2005) have led to curricula now used in Physics 2330, a physics course for Elementary Education majors at MU, serving 120 students/year.

- What evidence can be provided that content experts responsible for providing instruction to the teacher participants have experience and expertise in science teaching and pedagogy at the high school level?
- What evidence can be provided that project team members responsible for providing instruction to the teacher participants have expertise (or will gain expertise) in the development of mental models of physics concepts (e.g., modeling methodology, Socratic questioning:) relevant to a high school physics course?

(Both questions). Dr. Manivannan has received training on modeling physics techniques at the Arizona State University, which he has used to conduct PD for high-school teachers in physics and chemistry. He will train and advise the team on adapting modeling to the Physics First (PF) curriculum. Furthermore, we will use Mr. Rice (Clayton HS) as a consultant to train / advise us on adapting ASU's modeling (which is primarily a 12th grade curriculum) to 9th grade. Drs. Manivannan and Chandrasekhar already use several aspects of modeling in their pre- and inservice classes (including recording of students' qualitative predictive descriptions, variable identification, experiment planning and analysis, whiteboarding for student discussions and response, generalization of relationships from whole-class results). Some levels of Socratic Questioningⁱ are also used, such as Clarification probes, Assumption probes and Reason and Evidence probes.

- What evidence can be provided of successful networking experiences among those responsible for providing professional development, partner school districts, and high school science classroom teachers?

Ms. Torres has networked with several of our partners in several capacities as Science Coordinator, and was a prime mover in bringing our partners together following CPS's Curriculum Review Cycle in March 2005, where she initiated discussion and collected data on districts interested in Physics First. In the past, CPS was the hub of the Show-Me Science center, which provided science professional development and materials to districts across the state. Dr. Chandrasekhar has worked with the Columbia District and over 150 teachers from various districts throughout Missouri since 1993. Dr. Manivannan has worked with the Springfield district and teachers from other districts for at least ten years. Dr. Volkmann has worked with teachers from districts in MPER (Missouri Partnership for Educational Renewal) for over five years.

- It is essential that the project report findings inform and advance research in science education. How will the project utilize valid and reliable instruments and methods, recognized by the science education research community, to measure and evaluate

Points to be negotiated before awarding grant

progress toward the following goals: increasing teacher content knowledge (assessing for lack of knowledge, including misconceptions held by participants) and pedagogical skills (specifically those related to modeling and inquiry); increasing student achievement of physics conceptual understanding and science process skills; increasing student enrollment in advanced science/math coursework, numbers of certified physics teachers; and the development of collaborative professional development practices, including the effectiveness of PLTs and coaching/mentoring activities?

Please see answers given in Sec. VIII.

- How are or will the activities supported by outside science agencies (e.g., business, industry, informal science) be purposely designed to align with specific content knowledge/process skill goals of project?

9th grade teachers have worked and will continue to work with the Columbia Water and Light partner to develop the energy challenge modules to fit the GLEs / curriculum. A similar method will be used with CMAA. We will seek short internships for teachers with relevant businesses and non-profits.

- The descriptions of the Curriculum Committee work, as described on pages 7 and 10, are not congruent. Some described activities appear to be actual work that should be accomplished by an Advisory Board. How will curriculum be developed and by whom? How will the curriculum committee allow for the input of all partners during the design process?

As mentioned earlier, the Curriculum Committee has two roles – one as a “hands-on executive committee” to design the academy and the other as a curriculum-writing body. This was done deliberately, so that a body that meets monthly can have close input into the activities and design, rather than an external Advisory Board that is unable to meet as frequently. This dual role will be critical in the first year. After the first summer, the design-related role may decrease. Curriculum development process (page 10 of proposal): Curriculum construction will begin with monthly CC meetings in Nov 2005. At the first meeting members will examine existing resources, decide on a suitable lesson format, and divide the summer 2006 content into 6-8 modules. A CC subgroup responsible for writing the curriculum will consist of 2 panels: 2-3 writing teams and an advising team. They will begin with the first 2 steps of the backward-design model for 2 modules. The writing teams, which will consist of science teachers and faculty who have strong content and pedagogical knowledge, will spend the first month writing lessons for one module each. Teams will place materials on a secure web site for easy access by the CC. The advising team will review the lessons prior to the December meeting, and revisions will be discussed. The writing team will make revisions before the January meeting. In parallel, they will work on the next modules. A total of 6 teachers, 3 from the CC and 3 others assisting, will work on the writing teams. (Note: Due to the later start date the first meeting might occur only in Jan 2006).

See answer to the first question for comments on partner input.

SECTION VI – PROJECT NARRATIVE AND TIMELINE

- What evidence can be provided that the design of the project will address the content and pedagogical needs specific to a freshman-level physics course, as opposed to the typical

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content and pedagogy used in a traditional theory-based junior/senior level physics course, dependent on advanced mathematical understanding and skill?

Considerable input will be elicited from 9th grade teachers, Clayton teachers who teach Physics First (they teach 3 different levels), Dr. Volkmann, who has taught high school science, Dr. Tarr, the Math Education faculty member and district coordinators -- to ensure that the curriculum matches the mathematics preparation level of 9th grade students. We note that the ASU modeling curriculum will require change since it is NOT directly importable to 9th grade because of the level of math required. Furthermore, it is usually used to teach the pedagogy to teachers who are already experts in physics content. In contrast, we expect that the expertise of teachers in physics and math at our academy will vary widely. Our PD design will have to accommodate these variations. It is for this reason that we plan to conduct an early diagnostic test in Dec '05(now Feb '06) to ascertain the range of their strengths.

- There are objectives within objectives (e.g., objective 3 has 4 objectives embedded in it). If teachers learn how to model but do not learn the other three skills, how will they meet objective 3? How will each objective be measured and evaluated?

Evaluation of first three sub-objectives: Skills in modeling and inquiry-based instruction, student assessment are addressed in answers to questions in the Evaluation section (Sec VIII), 1 b and c. The evaluation of effective use of technology will be assessed within the instrument *Inside the Classroom Observation and Analytic Protocol* from Horizon Research, Inc, which is used for assessing teacher pedagogical skills.

- There is an obvious link in the program design between the pedagogy modeled and pedagogy learned in analyzing and modifying learning labs. How will other necessary links between strategies/activities and goals be made be established in the program/evaluation design?

Content depth and Alignment with GLEs: The link between strategies and goals is very strong. The content will be chosen to align with GLEs, with depth that is appropriate to 9th grade. The appropriateness of depth will be determined using expertise from several sources (see answer to first question in this section). Pre/post tests will measure the effectiveness.

Overall Physics Achievement of Students: Assessed via student tests constructed at academy; results analyzed by evaluator.

- How will real world applications be purposely designed so that a relevant and explicit connection between the proposed activities/resources and the content being taught in the summer workshops is evident?

The presenters' topics will provide real-world applications that are aligned with the GLEs. The sequencing of their presentations will be aligned with the curriculum for the day.

- The quality of the coach-mentor is considered a critical factor in the success of the program. What process and criteria will be used for recruitment and selection of mentor/coaches with high school physics teaching experience, preferably trained in the pedagogy being developed through the project?

We agree. The quality of the coach-mentors will be assured via recommendations from district personnel. Our preference is for retired district science personnel who have excellent mentoring experience and science background, for example those who have (1) taught high school physics (2) taught 9th grade physical science (3) are well regarded as mentors and observers of teachers (4) are supportive of the physics first concept. They will receive training using the Cognitive

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Coachingⁱⁱ or similar model. They will attend the summer institutes with the teachers and will thus be familiar with the content and pedagogy employed in the academy. We plan to have specifically tailored pedagogy discussions for them at selected times during the academy. Applications to recruit coach-mentors will be sent to district partners, and we will pro-actively seek recommendations from teachers who have received modeling training and from science coordinators / superintendents in partner districts.

- It is a concern that a more definite plan be in place for classroom teacher support through follow-up activities (e.g., PLTs, protégé relationships). The PLT and mentor-coach support is considered essential to the success of the project.
- When and how frequently will PLTs meet? How will they function?

PLTs will be formed by 3-4 teachers within schools or districts, or by combining districts. Their task of developing a powerful lesson, and the process is described on pages 14-15 of the proposal. PLTs will meet intensively for 2-4 weeks (10-12 hours) while they work on a lesson; later they will meet monthly to share lessons, student work, assessments and student data (total ~20 hours annual). In Year 1 a PLT will study their first lesson, advancing to a second lesson in years 2 and 3. Two PLT meetings will be attended by their coach-mentor. Communication with education faculty will be maintained through distance learning.

We note that the plan above may not address all the “nuts-and-bolts.” We want the teachers and the CC to have input on this function, before it is implemented in Fall 06. Districts may have different models that they prefer, and we are sensitive to their cultures. However, the tasks and time allocated must be adhered to.

- How will the grant support the PLT participants (e.g., release time, substitute pay)? How will school districts with fewer science faculty meet the PLT goals? Who is responsible for leading/facilitating the activities?

Support: We have included a stipend for 20 hours of PLT work for each school year (at the academy rate), in addition to one unit of graduate Science Education credit.

Districts with few teachers will be teamed with others via distance learning technology (with Mr. Puckett’s help). One PLT member will be designated as the leader, and will be responsible for calling meetings, scheduling, etc. In future years this position will rotate among members. The mentor will also provide advice through visits to the PLTs (in addition to individual visits).

- How will communication among partnership members, necessary for program sustainability and institutional change, be sustained beyond the first year?

We plan to conduct on-site meetings (with presentations / forum discussions) at the Interface and STOM meetings so we stay in personal touch twice annually. The website will be maintained beyond the grant period, and will provide opportunities for exchange of ideas and written materials. We expect to find funding to continue the kit lending-library, which will be a key factor to sustain institutional curriculum change. A key issue is to make sure that partners are actively discussing the future of PF beyond the grant period.

- How will additional funding, necessary for program sustainability and institutional change, be secured?

Changing federal and state budgets and priorities present difficulties in predicting future funding. The project team will seek MO-DHE Teacher Quality Improvement grants, and grants from federal agencies (National Science Foundation, and U.S. Department of Education). Districts

Points to be negotiated before awarding grant

may identify a part of their 1% PD budget to support PF. MU faculty will aggressively seek funding to support the PF kit lending program from local and corporate donors.

SECTION VIII – EVALUATION AND ACCOUNTABILITY PLAN

- Again, it is essential that the project report findings that can inform and advance research in science education. How will the project utilize valid and reliable instruments and methods, recognized by the science education research community, to measure and evaluate progress toward the following goals: increasing teacher content knowledge (assessing for lack of knowledge, including misconceptions held by participants) and pedagogical skills (specifically those related to modeling and inquiry); increasing student achievement of physics conceptual understanding and science process skills; increasing student enrollment in advanced science/math coursework, numbers of certified physics teachers; and the development of collaborative professional development practices? What valid and reliable tools will be used to identify misconceptions and monitor conceptual change? What rubrics/instruments will be used to evaluate pedagogical skill?
- Are both pre- and post-data being collected relevant to all goals?
- How will evaluation findings be communicated among members of the partnership and with the science education community outside of the partnership?

1. Valid and reliable instruments and methods

a. Teacher content/misconceptions/conceptual change

The Force Concept Inventory (FCI) with the addition of quantitative physics problems will be administered. The Mechanics Baseline Test will also be examined for its applicability – it is a higher level test that will not be fully usable. The FCI is a nationally validated test and has been in use since the early 1980s. It has been used in numerous research projects. Research articles on its use and the outcomes are available. In the second year, the *Conceptual Survey in Electricity and Magnetism*, a similar nationally validated test, will be used for those concepts. A similar test for the third year will be sought out to assess for content knowledge in heat, light, waves and sound. These tools also identify teacher misconceptions and track conceptual change over the time of instruction.

b. Student content and process skills

Teachers and university professors will develop the student pre/post tests during the summer academy. Tests will include items that test content and process. Teachers will construct items they determine to be developmentally appropriate for a 9th grade physics student. The items will be reviewed by the university faculty for content and face validity. The evaluators will then review the items and administer the tests to 40-50 subjects (students of up to three teachers) as a test, and will retest within two weeks to assess the reliability of the test. Content and face validity is assured as university faculty members involved with the physics PD training are monitoring test construction.

c. Teacher pedagogical skills

Mentors will be using the *Inside the Classroom Observation and Analytic Protocol* from Horizon Research, Inc. This protocol has been used with national Mathematics and Science Partnerships (MSP) as the instrument of choice and will be applied to this MSP project.

*Title II, Part B Mathematics and Science Partnership Program
Missouri High School Science Reform Initiative*

Points to be negotiated before awarding grant

- d. Increase in student enrollment in advanced science/mathematics courses.
School enrollment data will be obtained to track student enrollment in advanced courses. However, with the increase in DESE requirements to 3 years of science for all graduating students, this indicator will be difficult to address within the term of the grant period.
- e. Number of certified teachers
These data along with other data on professional development hours, course hours, certification status, etc., will be collected with the teacher surveys each year. The *2000 National Survey of Science and Mathematics Education: Science Questionnaire* will be adapted to remove questions irrelevant to this project and will be administered each year. The survey was developed by Horizon Research, Inc. with National Science Foundation funding and is used by other MSP projects to collect ongoing data on indicators that reflect teacher quality.

2. Pre/post data for all objectives

All project objectives with the exception of Objective 1 provide data collection pre/post intervention. Objective 1 addresses the design of a PD curriculum and will be evaluated for alignment to MO-GLEs and the NSDC staff development standards; pre- and post-data collection of course does not apply to this objective.

3. Communicating evaluation findings

Evaluation reports will be provided to the project team and partners twice yearly. An interim report to the team leadership will occur mid-year and a formal year-end report will be provided to the project participants identified by the leadership team. Informal communications will occur by phone and email on a regular basis and address emerging issues related to formative evaluation as well as ongoing project and project summative evaluation activities. The project leadership team will have responsibility for communicating the results outside of the project including joint articles and presentations that include the evaluation team.

SECTION IX – BUDGET NARRATIVE

- Materials and supplies for student use in the classroom are not allowable expenses (e.g., three sets of classroom kits – 10 sets of equipment each and consumables – totally \$58,000). Please revise the budget to reflect only those materials/resources necessary for use by teacher participants during the academy activities.

We will need 25 sets of equipment for use by 75 teachers during the academy (3 teachers/set). Please note that these materials are to be made available for the academic year lending libraries on a rotating basis (each teacher keeps the materials for about 4 weeks when they teach the unit). Thus these materials get maximal use - without belonging to any specific school. Furthermore, we note that larger districts will be able to pool teachers' individual kit sets for use in their classes. This luxury is not available to smaller districts. Thus the availability of the lending library of kits will allow all classrooms to be evaluated for similar treatment. Support for consumables to be used in classrooms has been removed from the budget.

- How will on-going district-level professional development (e.g., release time/substitute pay for PLTs, teacher-protégé meetings, coach-mentor/teacher meetings) be supported?

*Title II, Part B Mathematics and Science Partnership Program
Missouri High School Science Reform Initiative*

Points to be negotiated before awarding grant

We have included a stipend for 20 hours of PLT work for each school year (at the academy rate), in addition to one unit of graduate Science Education credit. Teacher-protégé meetings are to be supported via district inservice credit. Coach-mentors are supported for these meetings.

- The budget allows for consultants from other districts to speak about Physics First and modeling. Precisely how will they be utilized to meet the goals of the program? Why are they necessary if team members responsible for providing instruction to teacher participants have experience and expertise in the development of mental models of physics concepts (e.g., content knowledge, modeling methodology, Socratic questioning) relevant to a high school Physics course?

Consultants will be utilized for: RPDC personnel for coach-mentor training on cognitive coaching and PLTs and on lesson analysis; presentations /advice on adaptation of modeling methods to 9th grade (as mentioned earlier, the current ASU method is targeted to 12th grade); implementation results and how to avoid pitfalls in Physics First; teacher consultants from Clayton HS who are part of the CC for curriculum writing; Astronomy consultants and a trip to the planetarium at Columbia's Rock Bridge High School. Please note that these consultants are only budgeted for years 1 and 2. These skills are specific to Physics First and it is vital for team members to learn from others' experiences.

- The budget needs to reflect representation of all partners (including teacher participants) in activities, especially those noted as concerns previously (e.g., Leadership Team meetings, Advisory Board meetings, on-going, district level professional development).

Please note that all partners are included in the budget, even if they are not specifically split out by school district. Stipends and travel for all district partners, including teacher participants, are included in the CPS budget, as suggested at DESE's Sep 2 meeting. This includes stipends for district personnel when they attend committee or board meetings. Equipment kits for all teacher participants have been included in the MU budget to obtain the best bulk pricing. Room and board for all participants are in the MU budget in order to receive internal MU discounts and for ease of account transfers.

ⁱ R. Paul, *Critical Thinking: What Every Person Needs to Survive in a Rapidly Changing World*. (1993). Rohnert Park, CA: Center for Critical Thinking and Moral Critique, 1990.

ⁱⁱ Costa, A., & Garmston, R. (1997). *Cognitive coaching: A foundation for renaissance schools*, 3rd Ed. Norwood, MA: Christopher-Gordon.

APPENDIX D

APPENDIX D – STATEMENT OF NONPUBLIC SCHOOL PARTICIPATION



MISSOURI DEPARTMENT OF ELEMENTARY AND SECONDARY EDUCATION DIVISION OF SCHOOL IMPROVEMENT – FEDERAL DISCRETIONARY GRANTS STATEMENT OF NONPUBLIC SCHOOL PARTICIPATION TITLE II: PART B: MATHEMATICS AND SCIENCE PARTNERSHIP PROGRAM

NAME OF NONPUBLIC SCHOOL St. Ann's School	TELEPHONE NUMBER 417-358-2674
NAME OF NONPUBLIC SCHOOL CONTACT PERSON Paige Wagner	NAME OF SCHOOL DISTRICT IN WHICH NONPUBLIC SCHOOL IS LOCATED Carthage R-9

DIRECTIONS

To be completed by each registered nonpublic school in the public school district and submitted with the district's application.

This form is for the High School Science RFP submitted by the Columbia Public Schools Sep-Oct 2005. Return this form to:

Questions, contact (573)-214-3945; Fax: (573)-214-3998; or e-mail to: stores@columbia.k12.mo.us

PLEASE CHECK THE MOST APPROPRIATE STATEMENT:

- ☐ 1. Administrator and/or teachers in my school have been involved in the planning of this project. I plan for my teachers and/or students to participate in these programs.
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- ☐ 5. Administrators and/or teachers in my school have not been properly involved in the planning of this project. I need more information before I can decide whether or not my school should participate.
- ☒ 6. My school does not include secondary education.

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COMMENTS:

ORIGINAL SIGNATURE OF NONPUBLIC OFFICIAL

Paige A. Wagner

DATE

9-29-05

APPENDIX D – STATEMENT OF NONPUBLIC SCHOOL PARTICIPATION

MISSOURI DEPARTMENT OF ELEMENTARY AND SECONDARY EDUCATION
DIVISION OF SCHOOL IMPROVEMENT – FEDERAL DISCRETIONARY GRANTS
STATEMENT OF NONPUBLIC SCHOOL PARTICIPATION
TITLE II: PART B: MATHEMATICS AND SCIENCE PARTNERSHIP PROGRAM

NAME OF NONPUBLIC SCHOOL Chrisitan Chapel Academy	TELEPHONE NUMBER 573-874-2325
NAME OF NONPUBLIC SCHOOL CONTACT PERSON Walter Winn	NAME OF SCHOOL DISTRICT IN WHICH NONPUBLIC SCHOOL IS LOCATED Columbia

DIRECTIONS

To be completed by each registered nonpublic school in the public school district and submitted with the district's application.

Mail the completed form to: Federal Discretionary Grants, Missouri Department of Elementary and Secondary Education, PO Box 480, Jefferson City, MO 65102-0480

Questions, contact Federal Discretionary Grants: Ph: (573) 526-3232; Fax: (573) 526-6698;
or e-mail to: webreplyimprfdg@dese.mo.gov

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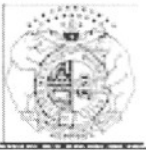
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COMMENTS:

ORIGINAL SIGNATURE OF NONPUBLIC OFFICIAL

DATE

9-30-05

APPENDIX D – STATEMENT OF NONPUBLIC SCHOOL PARTICIPATION**MISSOURI DEPARTMENT OF ELEMENTARY AND SECONDARY EDUCATION
DIVISION OF SCHOOL IMPROVEMENT – FEDERAL DISCRETIONARY GRANTS
STATEMENT OF NONPUBLIC SCHOOL PARTICIPATION TITLE II: PART B:
MATHEMATICS AND SCIENCE PARTNERSHIP PROGRAM**

NAME OF NONPUBLIC SCHOOL Christian Fellowship School	TELEPHONE NUMBER 573-445-8565
NAME OF NONPUBLIC SCHOOL CONTACT PERSON Jack W. Richens, Jr.	NAME OF SCHOOL DISTRICT IN WHICH NONPUBLIC SCHOOL IS LOCATED Columbia

DIRECTIONS

To be completed by each registered nonpublic school in the public school district and submitted with the district's application.

This form is for the High School Science RFP submitted by the Columbia Public Schools Sep-Oct 2005. Return this form to:

Questions, contact (573)-214-3945; Fax: (573)-214-3998; or e-mail to: stores@columbia.k12.mo.us

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COMMENTS:

ORIGINAL SIGNATURE OF NONPUBLIC OFFICIAL

DATE

9/29/2005

Kenneth Rankin
North County Christian School
845 Dunn Road
Florissant, MO 63031-8203

MISSOURI DEPARTMENT OF ELEMENTARY AND SECONDARY EDUCATION
DIVISION OF SCHOOL IMPROVEMENT - FEDERAL DISCRETIONARY GRANTS STATEMENT OF
NONPUBLIC SCHOOL PARTICIPATION TITLE II: PART B: MATHEMATICS AND SCIENCE PARTNERSHIP
PROGRAM

NAME OF NONPUBLIC SCHOOL
NAME OF NONPUBLIC SCHOOL CONTACT PERSON

NAME OF SCHOOL DISTRICT IN WHICH NONPUBLIC SCHOOL IS LOCATED

To be completed by each registered nonpublic school in the public school district and submitted with the district's application

This form is for the High School Science RFP submitted by the Columbia Public Schools Sep-Oct 2006. Return this form

to, Sara Torres

Questions, contact: (673)-214-3945; Fax: (673)-214-3998; or e-mail to: stores@columbia.k12.mo.us PLEASE CHECK

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COMMENTS:

ORIGINAL SIGNATURE OF NONPUBLIC OFFICIAL DATE

Kenneth Rankin 9/30/2005
Kenneth Rankin

APPENDIX D – STATEMENT OF NONPUBLIC SCHOOL PARTICIPATION



MISSOURI DEPARTMENT OF ELEMENTARY AND SECONDARY EDUCATION DIVISION OF SCHOOL IMPROVEMENT – FEDERAL DISCRETIONARY GRANTS STATEMENT OF NONPUBLIC SCHOOL PARTICIPATION TITLE II: PART B: MATHEMATICS AND SCIENCE PARTNERSHIP PROGRAM

NAME OF NONPUBLIC SCHOOL Blessed Teresa of Calcutta Catholic School	TELEPHONE NUMBER (314) 522-3888
NAME OF NONPUBLIC SCHOOL CONTACT PERSON Mrs. Karlye Keleher	NAME OF SCHOOL DISTRICT IN WHICH NONPUBLIC SCHOOL IS LOCATED Ferguson/Florissant

DIRECTIONS

To be completed by each registered nonpublic school in the public school district and submitted with the district's application.

Mail the completed form to: Federal Discretionary Grants, Missouri Department of Elementary and Secondary Education, PO Box 480, Jefferson City, MO 65102-0480

Questions, contact Federal Discretionary Grants: Ph: (573) 526-3232; Fax: (573) 526-6698;
or e-mail to: webreplyimprfdg@dese.mo.gov

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COMMENTS:

ORIGINAL SIGNATURE OF NONPUBLIC OFFICIAL

Karlye Keleher

DATE

September 30, 2005

APPENDIX D - STATEMENT OF NONPUBLIC SCHOOL PARTICIPATION



MISSOURI DEPARTMENT OF ELEMENTARY AND SECONDARY EDUCATION DIVISION OF SCHOOL IMPROVEMENT - FEDERAL DISCRETIONARY GRANTS STATEMENT OF NONPUBLIC SCHOOL PARTICIPATION TITLE II: PART B: MATHEMATICS AND SCIENCE PARTNERSHIP PROGRAM

NAME OF NONPUBLIC SCHOOL St. Vincent High School	TELEPHONE NUMBER 573-547-2560
NAME OF NONPUBLIC SCHOOL CONTACT PERSON Lisa A. Best	NAME OF SCHOOL DISTRICT IN WHICH NONPUBLIC SCHOOL IS LOCATED Perry County School Dist #32

DIRECTIONS

To be completed by each registered nonpublic school in the public school district and submitted with the district's application.

Mail the completed form to: Federal Discretionary Grants, Missouri Department of Elementary and Secondary Education, PO Box 480, Jefferson City, MO 65102-0480

Questions, contact Federal Discretionary Grants: Ph: (573) 526-3232; Fax: (573) 526-6698;
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COMMENTS:

ORIGINAL SIGNATURE OF NONPUBLIC OFFICIAL

Lisa A. Best

DATE

9/16/05

APPENDIX D - STATEMENT OF NONPUBLIC SCHOOL PARTICIPATION

MISSOURI DEPARTMENT OF ELEMENTARY AND SECONDARY EDUCATION
DIVISION OF SCHOOL IMPROVEMENT - FEDERAL DISCRETIONARY GRANTS
STATEMENT OF NONPUBLIC SCHOOL PARTICIPATION
TITLE II: PART B: MATHEMATICS AND SCIENCE PARTNERSHIP PROGRAM

NAME OF NONPUBLIC SCHOOL TRINITY CATHOLIC HIGH SCHOOL	TELEPHONE NUMBER 314 741 1333
NAME OF NONPUBLIC SCHOOL CONTACT PERSON MARY HEY	NAME OF SCHOOL DISTRICT IN WHICH NONPUBLIC SCHOOL IS LOCATED HAZELWOOD

DIRECTIONS

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ASSURANCES: Title IX of No Child Left Behind Act includes the following consultation requirements concerning the participation of nonpublic schools in Title II: Part B: Mathematics and Science Partnership Program.

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 - how the children's needs will be identified;
 - what services will be offered;
 - how, where, and by whom the services will be provided;
 - how the services will be assessed and how the results of the assessment will be used to improve those services;
 - the size and scope of the equitable services to be provided to the eligible private school children, teachers, and other educational personnel and the amount of funds available for those services; and
 - how and when the agency, consortium, or entity will make decisions about the delivery of services, including a thorough consideration and analysis of the views of the private school officials on the provision of contract services through potential third-party providers.
- Timing - Such consultation shall occur before the agency or consortium makes any decision that affects the opportunities of eligible private school children, teachers, and other educational personnel to participate in programs under this Act.
- Discussion required - Such consultation shall include a discussion of service delivery mechanisms that the agency or consortium could use to provide equitable services to eligible private school children, teachers, administrators, and other staff.

COMMENTS:

ORIGINAL SIGNATURE OF NONPUBLIC OFFICIAL

DATE

Mary Hey

9-21-05

APPENDIX D – STATEMENT OF NONPUBLIC SCHOOL PARTICIPATION



MISSOURI DEPARTMENT OF ELEMENTARY AND SECONDARY EDUCATION DIVISION OF SCHOOL IMPROVEMENT – FEDERAL DISCRETIONARY GRANTS STATEMENT OF NONPUBLIC SCHOOL PARTICIPATION TITLE II: PART B: MATHEMATICS AND SCIENCE PARTNERSHIP PROGRAM

NAME OF NONPUBLIC SCHOOL Archbishop O'Hara High School	TELEPHONE NUMBER (816) 763-4800
NAME OF NONPUBLIC SCHOOL CONTACT PERSON Walter Bowman	NAME OF SCHOOL DISTRICT IN WHICH NONPUBLIC SCHOOL IS LOCATED CSD-1 (Hickman Mills)

DIRECTIONS

To be completed by each registered nonpublic school in the public school district and submitted with the district's application.

Mail the completed form to: Federal Discretionary Grants, Missouri Department of Elementary and Secondary Education, PO Box 480, Jefferson City, MO 65102-0480

Questions, contact Federal Discretionary Grants: Ph: (573) 526-3232; Fax: (573) 526-6698;
or e-mail to: webreplyimprfdg@dese.mo.gov

PLEASE CHECK THE MOST APPROPRIATE STATEMENT:

- ☒ 1. Administrator and/or teachers in my school have been involved in the planning of this project. I plan for my teachers and/or students to participate in these programs.
- ☐ 2. I was invited to participate in planning but chose not to do so. My school will not participate in this program.
- ☐ 3. Administrators and/or teachers in my school have been involved in the planning of the project. I do not plan for my teachers to participate in these programs because of philosophical, religious, or other reasons.
- ☐ 4. Administrators and/or teachers in my school have been involved in the planning of this project, but the options for nonpublic participation does not seem equitable. Until changes are made for equitable options, I do not plan for my teachers to participate.
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 - (A) how the children's needs will be identified;
 - (B) what services will be offered;
 - (C) how, where, and by whom the services will be provided;
 - (D) how the services will be assessed and how the results of the assessment will be used to improve those services;
 - (E) the size and scope of the equitable services to be provided to the eligible private school children, teachers, and other educational personnel and the amount of funds available for those services; and
 - (F) how and when the agency, consortium, or entity will make decisions about the delivery of services, including a thorough consideration and analysis of the views of the private school officials on the provision of contract services through potential third-party providers.
2. Timing - Such consultation shall occur before the agency or consortium makes any decision that affects the opportunities of eligible private school children, teachers, and other educational personnel to participate in programs under this Act.
3. Discussion required - Such consultation shall include a discussion of service delivery mechanisms that the agency or consortium could use to provide equitable services to eligible private school children, teachers, administrators, and other staff.

COMMENTS:

ORIGINAL SIGNATURE OF NONPUBLIC OFFICIAL Walter Bowman	DATE Oct. 4, 2005
--	-----------------------------

Webb City School District R-7

411 North Madison * Webb City, Missouri 64870

"Striving to Prepare Today's Youth to Meet the Challenges of Tomorrow's World"

417/673-6000 417/673-6007(Fax)

Toby Bottom

Associate Superintendent
Support Services

Dr. Ronald Lankford

Superintendent of Schools

Reneé C. Goostree

Associate Superintendent
Instructional Services

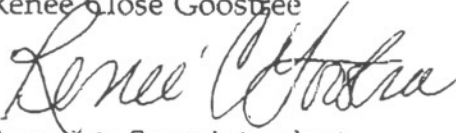
September 29, 2005

To: Sara Torres, Columbia School District

Topic: Appendix D- Statement of Nonpublic School Participation

We do not have any parochial schools in our district and the Department of Elementary and Secondary Education notified us that the schools in our area (located in the Joplin district) do not wish to participate in Title II programs. Therefore our Appendix D form is blank. I have included two e-mail communications between my secretary (Kathy Cole) and Janet McClelland (Federal Grants/DESE) to verify this information.

Thank You,
Renee Close Goostree



Associate Superintendent

APPENDIX D - STATEMENT OF NONPUBLIC SCHOOL PARTICIPATION



MISSOURI DEPARTMENT OF ELEMENTARY AND SECONDARY EDUCATION
DIVISION OF SCHOOL IMPROVEMENT - FEDERAL DISCRETIONARY GRANTS
STATEMENT OF NONPUBLIC SCHOOL PARTICIPATION
TITLE II: PART B: MATHEMATICS AND SCIENCE PARTNERSHIP PROGRAM

NAME OF NONPUBLIC SCHOOL <i>The Islamic School of Kansas City</i>	TELEPHONE NUMBER <i>(816) 965-0186</i>
NAME OF NONPUBLIC SCHOOL CONTACT PERSON <i>Rita Shadeed</i>	NAME OF SCHOOL DISTRICT IN WHICH NONPUBLIC SCHOOL IS LOCATED <i>CSD-1 (Hickman Mills)</i>

DIRECTIONS

To be completed by each registered nonpublic school in the public school district and submitted with the district's application.

Mail the completed form to: Federal Discretionary Grants, Missouri Department of Elementary and Secondary Education, PO Box 480, Jefferson City, MO 65102-0480

Questions, contact Federal Discretionary Grants: Ph: (573) 526-3232; Fax: (573) 526-6698;
or e-mail to: webreplyimprfdg@de-se.mo.gov

PLEASE CHECK THE MOST APPROPRIATE STATEMENT:

- ☒ 1. Administrator and/or teachers in my school have been involved in the planning of this project. I plan for my teachers and/or students to participate in these programs.
- ☐ 2. I was invited to participate in planning but chose not to do so. My school will not participate in this program.
- ☐ 3. Administrators and/or teachers in my school have been involved in the planning of the project. I do not plan for my teachers to participate in these programs because of philosophical, religious, or other reasons.
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- Discussion required - Such consultation shall include a discussion of service delivery mechanisms that the agency or consortium could use to provide equitable services to eligible private school children, teachers, administrators, and other staff.

COMMENTS:

ORIGINAL SIGNATURE OF NONPUBLIC OFFICIAL

DATE

APPENDIX D - STATEMENT OF NONPUBLIC SCHOOL PARTICIPATION



MISSOURI DEPARTMENT OF ELEMENTARY AND SECONDARY EDUCATION
DIVISION OF SCHOOL IMPROVEMENT - FEDERAL DISCRETIONARY GRANTS
STATEMENT OF NONPUBLIC SCHOOL PARTICIPATION
TITLE II: PART B: MATHEMATICS AND SCIENCE PARTNERSHIP PROGRAM

NAME OF NONPUBLIC SCHOOL <i>Islamic School of Greater Kansas City</i>	TELEPHONE NUMBER <i>(816) 763-0322</i>
NAME OF NONPUBLIC SCHOOL CONTACT PERSON <i>Yusuf Alhassan</i>	NAME OF SCHOOL DISTRICT IN WHICH NONPUBLIC SCHOOL IS LOCATED <i>CSD-1 (Hickman Mills)</i>

DIRECTIONS

To be completed by each registered nonpublic school in the public school district and submitted with the district's application.

Mail the completed form to: Federal Discretionary Grants, Missouri Department of Elementary and Secondary Education, PO Box 480, Jefferson City, MO 65102-0480

Questions, contact Federal Discretionary Grants: Ph: (573) 526-3232; Fax: (573) 526-6698;
or e-mail to: webreplyimprdg@desg.mo.gov

PLEASE CHECK THE MOST APPROPRIATE STATEMENT:

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COMMENTS:

ORIGINAL SIGNATURE OF NONPUBLIC OFFICIAL

Karam Mahamud

DATE

12/20/05

APPENDIX D STATEMENT OF NONPUBLIC SCHOOL PARTICIPATION



MISSOURI DEPARTMENT OF ELEMENTARY AND SECONDARY EDUCATION
DIVISION OF SCHOOL IMPROVEMENT - FEDERAL DISCRETIONARY GRANTS
STATEMENT OF NONPUBLIC SCHOOL PARTICIPATION
TITLE II: PART B: MATHEMATICS AND SCIENCE PARTNERSHIP PROGRAM

NAME OF NONPUBLIC SCHOOL Abiding Savior Lutheran School	TELEPHONE NUMBER 314-892-4408
NAME OF NONPUBLIC SCHOOL CONTACT PERSON Laura Montgomery	NAME OF SCHOOL DISTRICT IN WHICH NONPUBLIC SCHOOL IS LOCATED Mehlville

DIRECTIONS

To be completed by each registered nonpublic school in the public school district and submitted with the district's application.

-This form is for the High School Science RPP submitted by Columbia Public Schools October 2005

Questions, contact (873)-214-3946; Fax: (873) 214-3698;
or e-mail to: storres@columbia.k12.mo.us

PLEASE CHECK THE MOST APPROPRIATE STATEMENT:

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COMMENTS: This grant, "A Time for Physics First" would not serve our school because we service only grades K-8.

ORIGINAL SIGNATURE OF NONPUBLIC OFFICIAL

Laura Montgomery

DATE

12/21/05